Volume 93 Number 25

STEEL

For forty-eight Years—IRON TRADE REVIEW

PRODUCTION • PROCESSING • DISTRIBUTION • USE

The Week in Perspective

FAR from slipping into the winter doldrums, steel business, aided by generous injections of government-loan serum in the arms of consumers, is snapping back with cheerful alacrity. Production has lifted (p. 13) four points to 33 per cent of capacity, with further gains indicated this week. Structural shape awards ran up the highest total (p. 50) for the year, with one week excepted. . . . Contributing to this year-end bulge is the re-assertion (p. 11) by the American Iron and Steel institute of the code regulation requiring that all contracts must be shipped by Dec. 31 or cancelled. Thus, buyers of most steel products are scurrying to specify fully against present contracts, to avoid impending higher prices.

Plan To Announce Prices Two Months Ahead

This swelling in shipments is a repetition of what occurred at the close of the third quarter and to correct this condition it is proposed (p. 41) to announce prices two months in advance instead of ten days ahead as at present. Under this setup, second-quarter prices would be announced about Jan. 15 and as they probably will be several dollars higher the effect will be to drive in business throughout the quarter, rather than in the last week. . . . More railroad awards are being made, last week three roads inquiring (p. 53) for about 13,000 freight cars, government financed. . . . For only the second time in its history, the United States Steel Corp. goes outside its own ranks (p. 11) for a major executive—33-year old E. R. Stettinius Jr., who is with General Motors, to become vice chairman of the finance committee.

Season for Industrial Forecasting Is Here

Colonel Ayres, prominent Cleveland banker and forecaster, peers into the future and for 1934 sets a maximum steel production of 35,000,000 tons and automobile production of 2,750,000—prophecies (p. 19) which if borne out will make 1934 a fairly good year in contrast with the past two. . . . Parallelogram construction is embodied (p. 15) in the design of independently sprung wheels on new car models. . . . Again demonstrating his finesse in diplomacy, the President has peaceably settled the Peek-Wallace rift in the AAA, thereby strengthening his position (p. 14) before the coming congress. . . . More diplomacy may be required to settle controversy between the national labor board and Weirton Steel Co. (p. 10), the latter resenting the former's interference in the company's employe relations.

World's Largest Dam Slowly Taking Shape

Beside the projected government expenditure of $3,300,000,000 for public works, the sum of $165,000,000 to be invested in the construction of Boulder dam and power plant seems puny, but the latter structure looms as the greatest engineering achievement of the decade. With continuous firm power output of 663,000 horsepower, the world's largest dam is a tribute to modern technical skill and the efficacy of present-day materials, chief of which are steel (p. 21) and concrete; 50,000 tons of the former will be embodied in linings for huge tunnels to convey water from above the dam down through the turbines. . . . Dams and ice tongs are seldom associated, yet approximately 150 tons of steel is used annually in fabrication (p. 35) of the latter.

Starshells Along the Engineering Front:

Investigating the relative merits of milling and planing in metal cutting, engineers have found (p. 25) that each method has its place, important factors being the nature and characteristics of the material being cut. . . . Essentials for calculation of the flow of metal during rolling are (p. 26) that the stress condition in the roll opening be known, and that it be amenable to calculation. . . . A new research project will concern itself (p. 32) with the metallurgy of watchmaking. . . . Cylinders of compressed air are being used in small emergency jobs (p. 36) for driving rivets. . . . Surface defects and internal seams and cracks in cold-drawn bars are being ferreted out by a recently perfected (p. 38) magnetic test.

90% of Weirton Men Vote in Company-Conducted Election

RESISTING encroachment of the national labor board upon the agreement of Oct. 16, concerning the method of holding an election to select employe representatives for collective bargaining, the Weirton Steel Co. proceeded Friday with the election at its Weirton and Clarksburgh, W. Va., and Steubenville, O., plants.

The polls opened at 1 a.m. Friday and closed at night after all three shifts had ample time to vote. Representatives of the department of justice, the labor board and the West Virginia state police were present, but the election proceeded in orderly fashion and these groups functioned merely as observers.

Late Friday it appeared that 8000 votes would be cast when the polls closed, this being 92 to 94 per cent of employes on the rolls today and the same as voted in the primary, contrary to the union claim it is only 70 odd per cent. Some 3000 employes who were eligible either were temporarily laid off or not being on turn Friday did not vote.

Prior to the election, the labor board summoned to Washington the rules committee of employes and proposed changes in its form of organization, the qualification of voters and other essentials.

Contending that the agreement with the board permitted it only to control the details of election procedure, polling and counting of votes, the Weirton company broke with the board on the ground the board's proposed changes would upset the wishes of Weirton workers themselves.

Workers Carry Primaries

Primaries held Monday at all Weirton plants under supervision of the employe rules committee resulted in a sweeping victory for workers and a rout for the Amalgamated Association of Iron, Steel and Tin Workers. The Amalgamated, claiming a large majority of workers as members, exhorted the men not to vote, but 74 per cent of all those eligible voted. Ninety-eight candidates were nominated, of whom 49 were chosen Friday.

Whether the results of the election Friday stand may be determined in the courts, Sen. Robert F. Wagner, chairman of the labor board, threatening to turn the matter over to the department of justice.

NRA Administrator Johnson meanwhile was threatening to take the blue eagle away from the Weirton company. Denying any antagonistic attitude toward NRA, E. T. Weir, chairman of National Steel of which Weirton is a subsidiary, said:

"It has come to my attention that reports are being circulated that the Weirton Steel Co. is opposing the National Recovery Act (NRA). These reports are absolutely false, malicious and without foundation.

"The Weirton Steel Co. was one of the first to subscribe to the steel code, and is adhering to the National Recovery Act in every respect and doing its utmost to advance the national recovery program. This has nothing to do with our dispute with the labor board.

"I, personally, have at all times supported the President's program for national recovery, and again brand as false and malicious any statements to the contrary. I believe my fellow workers in this company are familiar with my record for speaking the truth."

Five months of the company employe representation plan have resulted in a settlement of 62 per cent of over 500 employe claims over wages, hours and other matters in favor of employes and only 10 per cent in favor of the management. The remainder either have been dropped or are pending.

In accordance with the wishes of employes, the payroll for the last half of November was used as a check sheet for eligibility. Representatives of the Amalgamated association demanded that the payroll for the first half of September, prior to the strike, be used.

Incidentally, paydays in all three Weirton plants have been advanced to Dec. 21 and 22 to give employes an extra payday before Christmas.

¶Reports from 206 iron and steel mills to the bureau of labor statistics give their October employment at 254,363 a decrease of 2.2 per cent under September but an increase of 44.2 per cent over October, 1932.

Sixty-six iron and steel forging plants report their October employment at 7214, a decrease of 7.9 per cent under September but 38.9 per cent over October last year.

In 143 machine tool plants in October 37,148 were employed, an increase of 21.6 per cent over September and of 103.5 per cent over October, 1932.

¶Columbia Steel Co., Pacific coast subsidiary of the United States Steel Corp., at Torrance, Calif., established a new plant record in November with 1330 men on the payroll and a two-week wage total of $70,000.

¶Twice as many industrial workers volutarily quit their jobs in July, August and September as in the previous quarter, and almost three times more than in the first quarter, according to the American Economic institute, New York.

The average annual voluntary labor turnover rate in industries is now estimated at 176,000 per million workers, compared with an average

A bull in a china shop might cause more destruction, but to the heating plant superintendent a piece of scrap iron in a coal screw conveyor can be just as annoying. The combination of the blowpipe and high test steel welding rod mended the damage, however. Photo courtesy of Linde Air Products Co.

of 83,000 per million in 1932. In the first quarter of 1933 the rate was only 54,000 workers, and in the second 89,200.

Discharges, resulting from growing discontent, also have doubled since the first of the year. In the first quarter the annual discharge rate was 15,200 workers per million, in the second quarter 20,800, and in the third 31,200, compared with an average of 19,500 in 1932.

Canada

W F. BOYD, president, Dominion Alloy Steel Corp., Toronto and Sarnia, Ont., confirms reports that English interests will shortly produce tin plate in Canada.

An arrangement has been entered into between the Dominion corporation and Richard Thomas & Sons, holding company for Grovesend Steel & Tin Plate Co., of England. The Sarnia plant will be operated as the Richard Thomas Co. Ltd.

Foundations are being laid for furnaces in the Dominion corporation plant at Sarnia, and machinery for two tinning units of 10,000 tons capacity is enroute from England to Canada. By Jan. 15 the first units are expected to be in operation and ultimate capacity is to be 50,000 tons of tin plate annually.

For the first time, tin mill black sheets will be manufactured in Canada and not just plated.

Cedric Thomas, of London, is superintending construction of the new plant at Sarnia. Associated with him are three tin plate experts from Llanelly, Wales: H. W. Wheatstone, A. Rosser and W. H. V. Hodgetts.

¶Meanwhile, declaring that tin plate is not at present made in Canada and therefore is not liable to the dump duty and appealing against dump duty paid on recent shipments, the Mundet Cork & Insulation Co. Ltd., Toronto, Ont., is appearing before the Canadian tariff board.

Behind the scenes is a battle between Welsh and American manufacturers of tin plate for the Canadian market. When the Canadian Steel Corp., subsidiary of the United States Steel Corp., ceased operations at Ojibway, Ont., May 31, production in Canada stopped.

Therefore, with no current production in Canada, imports from the United States come in at only 15 per cent without the dump duty. Previously, United States imports were subject to 20 per cent, plus dump duty, hence an advantage since the Ojibway mills were abandoned.

Tin plate from the United Kingdom is liable to dump duty if sold in Canada below the market; otherwise it is free. However, as soon as the Sarnia plant mentioned above operates, the advantage will pass to Welsh mills as they can enter free, compared with the 20 per cent plus dump duty from the United States.

U. S. Steel Corp.

A TRADITION of the United States Steel Corp. that it does not go outside for its high officials has been broken for the second time in 15 months.

First, when Robert Gregg on Aug. 1, 1932, was taken from the Atlantic Steel Co. to become vice president of the Tennessee Coal, Iron & Railroad Co., and subsequently president.

Now, with the selection of Edward R. Stettinius Jr., at present vice president of General Motors Corp., to become vice chairman of the finance committee effective April 1, 1934.

Edward R. Stettinius Jr.

It may be significant that Mr. Stettinius, son of the late Edward R. Stettinius, partner of J. P. Morgan & Co. and one-time assistant secretary of war, has been trained in industrial relations, personnel, employe representation and similar problems.

Only 33 last Oct. 22, Mr. Stettinius was educated at the University of Virginia, entered General Motors in 1924 through the Hyatt Roller Bearing Co., in 1926 was appointed assistant to the vice president in charge of accessory divisions, in 1930 was elevated to assistant to the president, and in May, 1931, elected vice president.

Member of the board and the executive committee of the National Industrial Conference board, Mr. Stettinius also brings to the Steel corporation an aviation tie-in, being director and vice president of General Aviation Corp., director and member of the executive committee both of North American Aviation Inc. and Transcontinental & Western Air Express Inc., and director of Eastern Air Transport.

The past six months he has been liaison officer between the industrial advisory board and NRA. As vice chairman of the finance committee, Mr. Stettinius becomes right-hand man to W. J. Filbert, who two weeks ago was chosen chairman of this committee, effective Jan. 1.

¶On Jan. 1, F. W. Waterman retires as president of the National Tube Co., subsidiary of the Steel corporation, under its pension plan, ending a practically unbroken tenure with the corporation and its predecessors since 1892. On Jan. 1, 1929, he succeeded Taylor Allderdice as president of the Tube company. Mr. Allderdice in turn was successor to William B. Schiller.

New president of National Tube is Benjamin F. Harris, now president of the Oil Well Supply Co., also a Steel corporation subsidiary, which post he will retain for the present. Mr. Harris entered the service of the American Sheet & Tin Plate Co. in 1903, becoming vice president and general manager of the Wilson-Snyder Co., from which he was transferred in 1929 to the presidency of the Oil Well Supply Co.

Institute

SUBJECT to one exception, shipments of all iron and steel products under fourth quarter contracts must be made prior to Dec. 31, the American Iron and Steel institute emphasized last week in a notice to all members of the NRA code.

The exception is in the case of a product required by a purchaser for a specified definite contract of such purchaser with a third party at a fixed price.

The practical effect of this stand, which is in accordance with the provisions of the code, is that mills will come up to Jan. 1 with no orders they can ship except those taken at first quarter prices, which in most cases represent an advance over the fourth quarter.

The memorandum of the institute is expected to have a clarifying effect on tin plate contracts, as the four-month limitation on making shipments against contracts automatically appears to terminate pre-code relations on Dec. 31.

There may be some fireworks as a result of this restriction on tin plate, the contention being that some consumers have had specifications in ample time, but that due to adverse operating conditions the mills in some cases will not be able to complete shipments by the end of the year and hence consumers will be confronted with a substantial advance on the required material after Jan. 1.

The effect of this memorandum

was seen last week when steelmaking operations rebounded 4 points to 33 per cent and apparently insured December production in excess of the November total.

But there will be a repercussion early in January when, if the memorandum stands, mills will have nothing to roll except bona fide first quarter contracts, comparatively few of which have been closed up to now.

¶Advances were filed last week on various wire products to become effective at Anderson, Ind., Dec. 23, and on high carbon spring wire at Chicago, also Dec. 23.

¶A new method of announcing quarterly prices is understood to have been adopted by steelmakers. Instead of waiting until the close of a quarter to publish prices for the following quarter, the announcement will be made about two months in advance. Thus, prices for the second quarter of 1934 are expected to be issued about Jan. 15. These prices, it is reported, will show advances of several dollars a ton.

¶The problem of deductions from the all-rail delivered price of iron and steel where transportation is by truck or inland waterway was discussed at the Thursday meeting of the institute at which Division Administrator K. M. Simpson and Donald R. Richberg, general counsel for NRA, attended as representatives of General Johnson.

Transportation

PETITIONS signed by 15,000 citizens of Mahoning and Trumbull counties, Ohio, and Lawrence county, Pennsylvania, embracing the Youngstown-Newcastle or so-called Valley districts, were presented last week to army engineers at Washington, urging reconsideration of the engineers' unfavorable report on canalization of the Beaver and Mahoning rivers. Republic Steel Corp. and Youngstown Sheet & Tube Co. joined with citizens.

A water outlet for the valley district was claimed essential to the future of the steel industry in the district. The six railroads serving the district are opposed to the improvement, which army engineers claim will cost higher than the estimate of $30,000,000.

A promise to review the project, reporting after Jan. 1, was made by engineers. Thomas J. Bray, former president of Republic, whose death is noted on page 16, devoted most of his recent years to the project.

¶River movement of coal from Colona, Pa., mines near Pittsburgh, to Conway, Pa., thence by rail to Youngstown, O., and Lorain, O., steel centers, will be severly affected by an interstate commerce commission ruling last week advancing the rail-water rate sharply.

Vehement protests by Pittsburgh coal mining interests, which had used this method of transporting coal, were immediately recorded by the official body of these mining interests, the Western Pennsylvania Coal Traffic bureau reporting that these protests had been over-ruled by the commission.

This bureau estimates that, considering handling costs, the new rate is virtually equal to an all-rail rate of $1.34 a ton. On the other hand, the commission contends that most of the mines in the Pittsburgh, Connellsville, Pa., and Fairmont, W. Va., districts cannot load coal direct to barges and, therefore, such a rate as the Colona-Conway, Pa., tariff affects these former mines adversely. Colona is on the Monogahela river.

The commission, in addition, ordered an increase in rates from river transport points in eastern Ohio on the Wheeling & Lake Erie railroad for shipment to Cleveland, Lorain, O., Canton, O., and Massillon, O.

Codes

NRA Administrator Johnson last week announced appointment of administration members of 90 of the code authorities created under approved codes.

Iron and steel was not listed but Division Administrator K. M. Simpson, Donald R. Richberg, general counsel for NRA, and General Johnson have been considered the three members. At last Thursday's meeting of the American Iron and Steel institute, Messrs. Simpson and Richberg were present.

Eight specific duties are charged up to these representatives, principally to see that codes do not promote monopolies or oppress small enterprises, guard against nonobservance of codes, and in general to be a watchdog for labor and the public.

The list of administration members on the code authorities includes:

Antifriction bearing, Neal W. Foster.
Buff and polishing wheel, Neal W. Foster.
Buffing and polishing composition, Neal W. Foster.
Boiler manufacturing, Neal W. Foster.
Business furniture, storage equipment and filing supply, Walter A. Janssen.
Cast iron soil pipe, H. M. Halsted Jr.
Copper and brass mill products, H. O. King.
Compressed air, Neal W. Foster.
Canning and packing machinery, George S. Brady.
Fabricated metal products manufacturing and metal finishing and coating industry, Laurence J. Martin.
Farm equipment, George S. Brady.
Gasoline pump manufacturing industry, R. B. Paddock, R. E. Langston and A. E. Davenport.
Gas cock industry, George S. Brady.
Gear manufacturing, Neal W. Foster.
Laundry and dry cleaning machinery, George S. Brady.
Malleable iron, H. M. Halsted Jr.
Machine tool and equipment distributing, Neal W. Foster.
Machine tool and forging machinery, Neal W. Foster.
Pipe nipple manufacturing, William Lawson.
Rock crusher manufacturing, George S. Brady.
Road machinery manufacturing, George S. Brady.
Reinforcing materials fabricating, Frank Upman.
Steel casting, H. O. King.
Special tool, die and machine shop, Neal W. Foster.
Steel tubular and firebox boiler, Neal W. Foster.
Shovel, dragline and crane, George S. Brady.
Warm air furnace, Beverly S. King.

¶Thursday, Dec. 21 will be a field day for codes when Deputy Administrator H. O. King conducts a hearing on codes for 40 allied capital machinery industries. These codes are sponsored by individual associations affiliated with the Machinery and Allied Products institute, 27 having their first hearing and 13 being reconsidered in the general grouping.

These codes are uniform in providing a 40-hour work week and minimum wages of 40 cents an hour with a proviso for a 35-cent rate where labor was paid less on July 15, 1929, than at present.

The new codes involved in the hearing are:

Bakery equipment, sprocket chain, locomotive, railway and industrial springs, steel tires, wire machinery, hair clippers, oil field pumping engines, jacks, envelope machines, mechanical lubrication, rolling mill machinery, chemical engineering equipment, power transmission equipment, contractors pumps, caster and floor trucks, diamond core drills, roller and silent chains, water softeners and filters, reduction machinery, concrete mixers, air filters, refrigerating machinery, hydraulic machinery, waterpower equipment, railway appliances and small locomotives.

Codes being reopened for participation in the general hearing are:

Beater, jordan and allied equipment, cereal machinery, conveyor and material preparation equipment, diesel engines, hoists, hoisting engines, kilns, coolers and dryers, pulverizing machinery and equipment, rock and ore crushers, sawmill machinery, steam engines, water meters and woodworking machinery.

¶Price agreements "not expressly sanctioned by an approved code" are a violation of the antitrust laws, NRA Administrator Johnson declared last week in postponing until Jan. 9 the public hearing on price increases originally scheduled for Dec. 12. Thus far no properly authenticated evidence of unwarranted price increases has been filed.

Trade and industrial groups are not exempted from provisions of the antitrust laws except insofar as they are expressly authorized to act in accordance with the specific provisions of the code or agreement under the recovery act approved by the President, according to General Johnson.

¶H. H. Kerr has been elected chairman of the code authority of the gear manufacturing industry and J. C. McQuiston, secretary, American

Gear Manufacturers' association, Wilkinsburg, Pa., is secretary. Members of the code authority and their territories are: H. H. Kerr, New England area; R. C. Ball, metropolitan area; Richard Ferguson, southern area; Howard Dingle, central area; F. H. Fowler, western area; F. B. Drake, Pacific coast area.

¶NRA reports that complaints against high prices are most frequently made by retailers against jobbers and manufacturers. Most complaints originate in the West, with the East next and the South last. Among commodities complained of as being out of line are wire and aluminum.

¶Chain Institute Inc., representing 95 per cent of the manufacturers of chain, except transmission and cast chain, has requested permission to operate under a supplemental code to the fabricated metal products code, approved Nov. 2. A hearing was to be held in Washington Dec. 18.

Similar action has been asked and a similar hearing granted to manufacturers of tools and implements, hand chain hoists and electric industrial trucks.

¶Revision of the administrative labor and fair practice articles of the proposed code of the machine knife and allied steel products industry was agreed upon without dissent at a hearing Dec. 11.

¶Steel joist industry code, heard at Washington Dec. 11, evoked numerous objections, one from structural steel fabricators, claiming that stringers of bridges belong to the structural steel and not the steel joist industry. A 30-hour work week and a $25 minimum weekly wage are proposed by the code. J. F. Curley, president of the Steel Joist institute, said an attempt had been made to parallel as nearly as possible the iron and steel and the reinforcing steel materials codes.

¶Code hearings set for Dec. 19 include the steel barrel and drum, galvanized ware steel package, washing machine parts and milk and ice cream can industries, all being supplemental to the fabricated metal products code. On Dec. 20 codes for the die casting and chilled car wheel industries will be heard.

¶Pierre S. DuPont, chairman of E. I. DuPont de Nemours & Co., and director of General Motors Corp., has become chairman of the industrial advisory board of NRA, succeeding Louis E. Kirstein, of Boston. Five new members have been added to the board, including Morris E. Leeds, president of Leeds & Northrup, Philadelphia; William T. Kemper, National Bank of Commerce, Kansas City, Mo.; William A. Harriman, chairman, Union Pacific Railroad Co., New York; A. Lincoln Filene, William Filene's Sons Co., Boston; and Thomas H. McInnerny, president, National Dairy Products Corp., New York. Myron C. Taylor, chairman, United States Steel Corp., is a holdover member.

¶NRA Administrator Johnson Dec. 12 approved modification of the PRA agreement for the structural iron and steel fabricating industry, permitting the industry to substitute labor provisions of its pending code for similar provisions of the agreement.

Production

UNDER the lash of expiring fourth quarter contracts, steelmaking operations took an unexpected spurt of 4 points last week, going to 33 per cent, and regaining all the ground lost since the third week of October. The prospect is that any change this week will be on the up rather than the down side.

Only New England showed a loss, receding from 81 per cent to 71, as one basic furnace was taken off. Billet stocks there are better balanced and part of the recent high rate in New England has been for replenishment.

Wheeling mills were unchanged last week at 41 per cent of capacity, with 15 out of 37 open hearths active, while Birmingham held at 52 per cent, the rate attained a week ago prior to resumption at the Ensley rail mill. All other districts showed an increase.

Pittsburgh mills advanced 4 points to 28 per cent, but this week a decline is expected to set in, and one steelworks blast furnace has been banked.

Chicago also lifted 4 points last week to 29½ per cent, with 8 out of 36 steelworks stacks still active.

Central eastern seaboard producers lifted 4½ points last week to 23 per cent, and may go even higher this week prior to the holiday letdown.

Cleveland improved 5 points to 59 per cent. The Corrigan, McKinney Steel Co. lighted another open hearth, Otis Steel Co. continued with five on, and National Tube at Lorain with 10.

Great Lakes Steel Corp., at Detroit, added one open hearth last week and has scheduled another for this week, which with the four Ford furnaces advances Detroit from 36 per cent to 52.

Buffalo opened last week at 24 per cent and closed at 27, and with 13 open hearths scheduled for this week will probably average 35 per cent.

Youngstown mills, averaging 36 per cent last week, a gain of 1 point, were expected to rise to 38 per cent this week on the strength of another bulge in buying of light steel products.

¶Lynchburg, Va., pressure pipe foundry of the Alabama Pipe Co., Anniston, Ala., reopened Dec. 5 with 200 men back at work.

Labor First, but Stockholders Next

IRON and steel producers will continue to recognize their first and paramount obligation to their employes," said Donald B. Gillies, president, Corrigan, McKinney Steel Co., Cleveland, before the American Mining congress in Washington, Friday.

"Work and a decent living wage for as many people as we can possibly employ are accepted principles in the industry. Dividends on common and even preferred shares of most steel companies have been stopped, but we cannot permanently forget our obligation to our stockholders.

"We must restore the steel industry to a profitable basis, where we can not only give labor its fair due, but also give a reasonable return to stockholders, to many of whom income from dividends may be no less important than wages are to workers.

"Failure to do this can bring only one result. Were we to continue to operate without profit, reserves already sorely depleted would vanish, new financing would be impossible to obtain, and present capital would be withdrawn or depleted. There could then be only one outcome.

"Plants would be completely shut down and thousands of employes would be thrown out of work. No new capital is needed in the industry now to build or to expand capacity, but it is necessary to expend vast sums every year to keep plants and equipment in a state of repair and efficiency to meet an ever-changing consumer demand in normal periods and any exceptional requirements which a national emergency may impose."

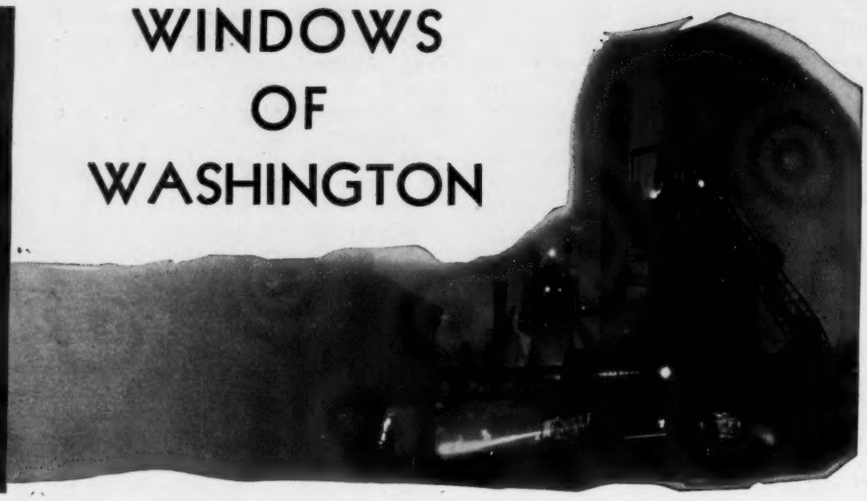
Steel has been under fire because the public has been led to believe that it is a heartless industry, "harsh and selfish toward labor, operated along monopolistic lines and feeding upon fat profits."

Actually, according to Mr. Gillies, in no trade is competition more severe, and in recent years its earnings per dollar of investment have been among the lowest of all industries.

Between June and October, Mr. Gillies pointed out, the number of employes was increased 21 per cent, the average hours of work per week per employe was lowered nearly 20 per cent, and the increase in total wages paid was more than 22 per cent.

Mr. Gillies forecast a substantial improvement in demand for iron and steel in 1934, saying that "evidence is accumulating that steel mill operations have passed their lowest point in the depression."

WINDOWS OF WASHINGTON



President Passes Farm Test

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Low Liquor Taxes Ominous

• • •

Need Johnson Push in PWA

WASHINGTON

EVERY test of his power and program appears only to leave the President more completely master of the situation. His adjustment last week of the rift in the department of agriculture was more evidence and, what is equally important, strengthened his hands immensely with the coming congress.

At no time has a genuinely unruly congress, such as harassed Mr. Hoover, been in prospect, but it would be looking for the millenium to expect the next session to be as docile and co-operative as the last one. For one thing, NRA is certain to draw some fire and the Republican minority will be building up a record for the elections next fall.

Congress, however, is not blind to the fact that the resignations of the so-called sound money men from the treasury did not arouse the country, "baloney money" faded quickly from the front pages, the majority of people seem still to prefer professors' theories to Wall Street practices, and the President was able to retain a man strong with the farmers—George N. Peek—without alienating the Tugwell radicals. Even the National Association of Manufacturers last week backed up the President's monetary policy, with reservations.

The showing of the congress convening Jan. 3 certain to be the issue in the next congressional elections, less than a year distant, there is every indication that a tie-in with the administration will be an asset, and so a strong Democratic majority behind the President is assured. Certainly, nothing will become law against the will of the President or over his veto.

So those close to the President continue convinced that the role of industry is to co-operate with the present program. They point out that business is improving and the prospect for early 1934 increasingly bright despite uncertainty over money. And the disclosure that the President has been attempting to stabilize with England is regarded as assuring.

The practical fact is that, radical as the President appears to be at times, the alternative is a Democratic congress which is even less sympathetic to business.

The more the administration's program is studied the more substantiation there is for the theory that the President is trying to walk as closely to the brink of the precipice as possible to placate radical sentiment, while stopping just of going over, for the benefit of conservative thought.

Incidentally, the President's recommendation to congress that it arrive at a liquor tax with the thought of routing bootleggers first and of obtaining revenue sceond does not bode well for industry. Money to pay for the public and civil works programs must come either from taxes or the printing press, and liquor revenue apparently will fall short of early hopes.

FEW in Washington expected to see the day when NRA Administrator Johnson would be considered a conservative, but it has happened. His friend, retiring AAA Administrator Peek, turned the much disputed and delayed codes for the food industries over to him in preference to leaving them with the Tugwell group.

There have been some occasional rumors that General Johnson would be sacrificed if too great a roar against NRA were let out in congress, but the odds are heavily against this. As was noted here several months ago, General Johnson has been tending slowly, though sometimes uncertainly, toward "the right", especially since he has got the more important industries codified.

Recently, the general has been an economic expert in defense of gold and other government policies. Many in Washington have said that what the public works administration needs is the driving force the general put behind NRA, and were the President to transfer him to Secretary Ickes' post it would not occasion much surprise.

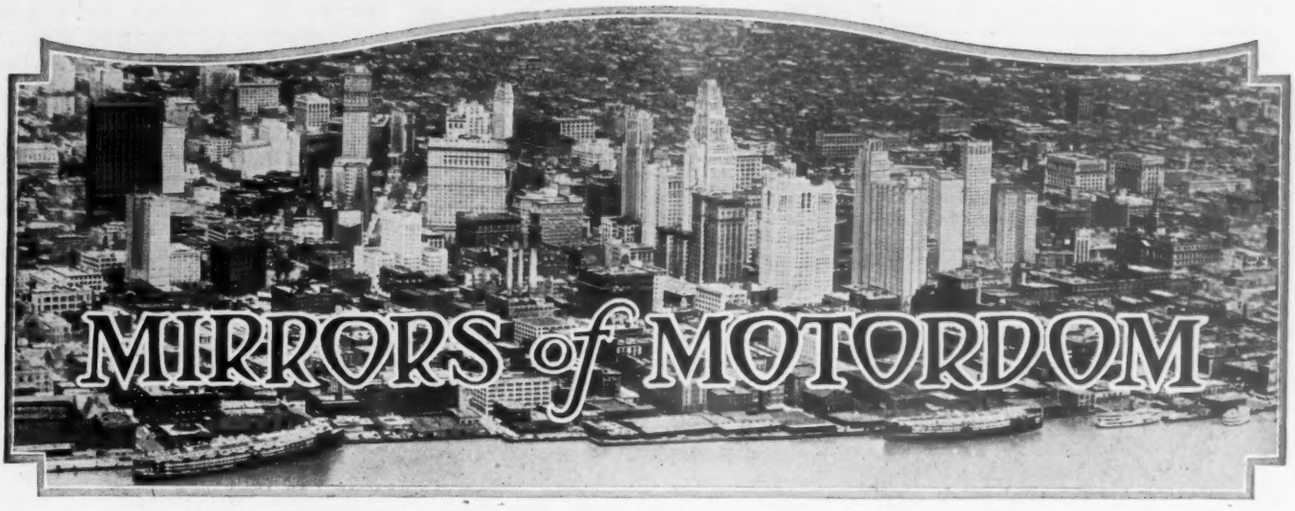
Without question, the civil works administration was pushed into the breech because the public works program was lagging. A fundamental mistake was made when the RFC set-up was not utilized at the start, and PWA has never caught up. At the moment, more lectures on morals than actual dollars are being given out by PWA.

Funds of the civil works administration—$400,000,000—will carry it only to Feb. 15. Probably $350,000,000 more will be needed to carry it to May 1, when highways and public buildings now projected should be under way. This $350,000,000 the President expects to be appropriated without question.

Stories of the effect of CWA wage rates upon labor are filtering into Washington. In a suburb of Detroit, for example, bricklayers and electricians are paid $1.25 per hour. The result has been that some of these craftsmen have quit industrial jobs to get on the CWA roll.

On this point, at least, industry will agree that General Johnson is conservative. He believes labor should not be among the government's representation on code authorities. William Green, president of the American Federation of Labor, takes issue.

In the case of iron and steel, labor's demand is for a union leader to sit in on meetings of the American Iron and Steel institute, even though the great bulk of labor in the industry is not enrolled in the federation.



Parallelograms Aid Springs

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Hudson Conceals Spare Tire

• • •

Code Curbs "Long" Trades

DETROIT

KNEE action or independent springing of front wheels on the new Hudsons and Terraplanes is effected by the use of a parallelogram (Webster: A quadrilateral with opposite sides parallel) between the front springs.

Semi-elliptic springs and steering are unchanged, and from the springs out to the wheels conventional mounting is retained. But between the springs the customary I-beam axle section is supplanted by the parallelogram.

This consists of two rigid drop-forged steel links, mounted one above the other, at each end of which are integrally-forged forks. Through these forks pass pins, which with the links form the four sides of the parallelogram.

The axle thus is articulated, permitting vertical action while maintaining alignment. Each wheel can rise and pass over an obstruction without affecting the other. Roller bearings in the pins prevent friction.

Since the change is made entirely within the front axle, a standard axle can be substituted for the so-called axleflex system. A corresponding parallelogram on General Motors cars is mounted between the frame and the wheel. Incidentally, General Motors coined the phrase "knee action," but it is being used generally.

Among other changes in the Hudson-Terraplane line for 1934, the spare tire is invisible except when the buyer specifies fender wheels. A compartment in the rear, which is more beaver-tailed than last year, is hinged at the top and accommodates not only the spare tire but also luggage. The sleek lines of the rear thus are broken only by the chrome-plated handle to this compartment.

Hand choking is entirely eliminated, a metal thermostat governed by the temperature of the engine providing an extra rich mixture at the start. There is neither a throttle nor a choke lever. Cylinder blocks are a high chrome alloy, of much the same analysis as the exhaust valve seats used by some manufacturers.

All engines are a little larger, and an optional head offers a compression ratio as high as 7 to 1. The terms Essex and Terraplane eight are eliminated. For 1934 there will be a Terraplane six on two lengths of wheelbase and two Hudson eights on different wheelbases.

AFTER a year's trial, the cast alloy camshaft becomes standard for all Hudsons and Terraplanes. Chrysler this year is adopting it for Plymouth and DeSoto, and probably for the rest of the line. All Fords will shortly come through with cast alloy crankshafts.

Mechanically, Plymouth will be little revised for 1934. Wheelbase remains at 108 inches, the 6-cylinder engine is unchanged in dimensions at 3⅛ x 4⅜ inches but with a slight enlargement in piston displacement to 201 cubic inches, front wheels are independently mounted with coil springs supplanting semi-elliptic ones.

Plymouth, it will be recalled, had virtually concluded its 1933 run late in the fall when the retail market opened up. More materials were purchased and the schedule was expanded, but now it appears to have over-bought, material still being on hand for about 4000 jobs. Presumably these will be built, and their disposal may hold back sales of the new models to some extent.

DeSoto will go radical with its Airflow type of body, but it will be rather conservative mechanically. It is retaining semi-elliptic springs forward, increasing the length about 8 inches to 43½ inches and extending the rear ones 1 inch to 52½. The engine, still a six, has a slightly larger bore and stroke at 3⅜ x 4½ inches, resulting in piston displacement being expanded from 217 to 241 cubic inches.

DeSoto retains selective free wheeling, but it is out of Plymouth.

BUICK, slated to show its 1934 line this week, is operating on a schedule of 6000 units this month and 7500 in January. The tentative schedule for Buick for 1934 is 75,000 units.

One of the perennial rumors of Detroit is being revived: Buick is figuring on a low price car for spring. This cheaper Buick is in the same category as the small Hupp, the $400 Ford (of which more later), and the moderate price Packard and Lincoln. It is a possibility in spring if an enormous retail market develops, but probably not otherwise.

General Motors starts 1934 blanketing the field under $1000 pretty well. There is the Chevrolet six, the new Olds six with hydraulic brakes priced just above Chevrolet, the Pontiac eight, the Olds eight and the lower brackets of Buick—what might be considered five separate lines.

Anyway, General Motors' experience with lower price companion cars has not been happy. The standard Chevrolet found no market this year, Marquette is just a memory of Buick, LaSalle has been a load for Cadillac to carry.

Except that Pontiac outlived the parent Oakland, no General Motors dualing of production has survived. LaSalle might be another exception, but substituting a straight eight engine for the V type for 1934 and dropping it below $2000 almost completely renovates it. Viking will be recalled as a short-lived running make for Olds.

This matter of designing a companion car that is lower priced is extremely difficult. Certain standards

pervade an organization and it becomes almost impossible to build down to a price. Buick engineers invariably got back to Buick principles and standards in designing Marquette, and the result was that Marquette was too good a car for the money. Packard has tried it, and Hupp has assembled figures, but plans never got beyond drawing boards.

There was a time when Buick was the principal moneymaker of General Motors; that was when the average Buick retailed for about $1700. Year by year Buick has gone down the scale in price, and shortly La Salle will edge into what was the range for the Buick 90 this year. Chevrolet and Pontiac were the profitable cars for General Motors in 1933, and now the Olds six is being entered against Dodge six to skim more cream off the $600 market.

Ford, for the first time in several years having the jump on his competitors, continues to increase the force at Fordson and is operating 5 days a week on a schedule that will put December production above 25,000 units.

While continuing with a separate fuel pump and a new type carburetor which functions in a dual capacity, each half feeding four cylinders, Ford experiments on a combined carburetor and fuel pump are continuing. Budd also is working on a new type of brake drum for Ford, the wearing surface being cast iron.

Reports circulate frequently concerning the small V-eight engine for the car Ford is expected eventually to bring out in the $400 class or lower. The cast alloy crankshaft for this engine is said to be slightly less than 24 inches long and to have a diameter greater than the stroke, hence not requiring throws. Unconfirmed reports give this engine a bore of about 1⅜ inches and a stroke of about 2¾ inches.

LEVELLING-OFF of used car values under the NRA code for the motor vehicle retail trade will be watched with special interest in connection with two lines of cars.

These two lines are priced about $100 to $125 above the next lowest classifications of the same makers. For all practical purposes they use the same chassis, brakes, transmissions and bodies as the next lower line. Engines are slightly larger and fenders and hoods differentiated.

Because so many parts and dies are interchangeable, it is estimated that the additional cost of manufacturing is not much over $35 to $40 per car. The $100 to $125 higher retail price, however, permitted "longer" trades in the past and frequently corralled deals that might have been lost.

Now, of course, all trades theoretically will be identical and this advantage disappears.

Died:

THOMAS J. BRAY, 66, for 17 years president of the former Republic Iron & Steel Co., Youngstown, O., at the offices of the Youngstown Sheet & Tube Co., Youngstown, Dec. 11. He was director and member of the executive committee of the latter company.

Born in Pittsburgh in 1867, he later became chief draftsman of the Lewis Foundry & Machine Co. Resigning that position, he entered Lehigh university, Bethlehem, Pa., and was graduated in 1894 with a degree in mechanical engineering. He then became associated with the Ohio Steel Co., and in 1901 was named

Thomas J. Bray

chief engineer of the United Engineering & Foundry Co., Pittsburgh.

From assistant to the president in charge of construction, his first official connection with the Republic organization, he advanced to vice president in charge of operations, and in 1911 was chosen president. He resigned in 1928 when the Republic Steel Corp. was formed. He had served as director of the Republic company and president of various subsidiaries. Recently he was interested in waterway development in the Valleys.

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John M. Lontz, 71, president, F. & N. Lawnmower Co., Richmond, Ind., since its organization in 1904, at his home in that city, recently.

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Thomas Murcott, 71, president, Murcott & Campbell Inc., New York, file manufacturers, at Flower hospital in that city, Dec. 10.

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John Schimmel, 68, veteran employe of the United Engineering & Foundry Co., Pittsburgh, and one of the best known greeters of visitors among Pittsburgh industrial plants, at Pittsburgh, Dec. 6.

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Milton D. McIntyre, head of the insurance, safety and welfare department of Pickands, Mather & Co., Cleveland, at his home in Lakewood, O., Dec. 10. He began work with the company as mail clerk in 1895.

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Frederick Lackner, 77, until his retirement in 1931 consulting engineer for Neely Bolt & Nut Co., Pittsburgh, at Pittsburgh, Dec. 9. Prior to his retirement he had been in the bolt and nut business for 50 years.

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Otto Ricker, 62, superintendent, Badger Malleable & Mfg. Co., South Milwaukee, Wis., since its organization, Dec. 6. at Milwaukee. His brother, Adolph J. Ricker, is president and general manager of the company.

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William J. Clarke, 52, Detroit representative for Mahoning Valley Steel Co., Niles, O., and the Brainerd Steel Co., Warren, O., at his office in the General Motors building, Detroit, Dec. 7. Vice president of the American Forging & Socket Co., Pontiac, Mich., as well as the Knight Menard Co., Detroit, he had been a resident of Detroit for 20 years, identified with the automobile industry in various capacities.

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Miney J. Hurley, 72, long identified with the steel industry, at Lakeside hospital, Cleveland, Dec. 10. His first position was with the Newburg plant of the American Steel & Wire Co., Cleveland, and ten years later he was made superintendent of this company's rod mill at Rankin, Pa. Later he was placed in charge of the Ensley, Ala., plant of Tennessee Coal, Iron & Railroad Co. He retired 20 years ago.

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Clifford F. Messinger, 44, president, Chain Belt Co., Milwaukee, Dec. 13, in that city. He was born in New Haven, Conn., and following his graduation from Sheffield scientific school at Yale unversity in 1911, joined the Chain Belt organization as a college apprentice. He was successively advertising manager, sales manager, asistant to the president, vice president, and since December, 1930, president, having succeeded his brother, C. Raymond Messinger, when the latter became president of the Oliver Farm Equipment Co. Mr. Messinger also was a director of the Interstate Drop Forge Co., Sivyer Steel Casting Co. and Federal Malleable Co., all of Milwaukee.

Industrial Men in the Day's News

H. B. Pearson, President, International Acetylene Association

Born in St. Louis, he has been active in the acetylene industry for a period of over 20 years.

His early work with acetylene saw its use for automobile lighting, later for welding and cutting.

Long active in association work, he heads an organization with 15 plants and warehouses in six cities.

ASSOCIATED with the acetylene industry since the days when automobile lights provided a leading market for the gas, H. B. Pearson, president, Compressed Industrial Gases Inc., Chicago, was honored by being elected president of the International Acetylene association at its recent annual convention. He has been a director of the association for a number of years and recently served as vice president.

Mr. Pearson was born in St. Louis, July 4, 1878, and engaged in various industrial enterprises prior to becoming connected with the acetylene industry in 1912. At that time he joined the Searchlight Co., Chicago, as vice president and general manager. This company originally manufactured acetylene for automotive use, later selling its products also for welding and cutting purposes.

In 1917, after the company was taken over by the Air Reduction Sales Co., Mr. Pearson joined the Burdett interests in the operation of their various oxygen and hydrogen plants and warehouses, serving as president of one company and an officer and director in five others.

Compressed Industrial Gases Inc. was formed in 1928 with headquarters in Chicago, as a holding company for the Burdett Oxygen & Hydrogen companies of Chicago and Pittsburgh and the Burdett Oxygen companies of Detroit, Chattanooga, Tenn., Oklahoma City, Okla., and Ft. Worth, Tex., operating 15 plants and warehouses. Mr. Pearson then was made president.

He also has been active in work of other associations identified with the industry, being an ex-president of the Gas Products association and serving on the executive committee of the Compressed Gas Manufacturers association.

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Henry A. Taubensee, senior member, Taubensee & Richards, 400 West Madison street, Chicago, the latter Chicago district sales representatives for Empire Sheet & Tin Plate Co., Mansfield, O., originally was associated with the Canton Art Metal Co., Canton, O. Later he became sales manager for the Massillon Rolling Mill Co., Massillon, O., now a division of Republic Steel Corp. After ten years' association with this company, he left in 1919 to engage in business for himself at Chicago.

In 1925 he retired temporarily from the business he had established to become general sales manager for the Superior Sheet Steel Co., Canton, O. Two years later, when this company was merged with the Continental Steel Corp., Kokomo, Ind., he was named vice president and general sales manager and moved to Kokomo. In 1930 he returned to Chicago to resume the business he had started.

Donald M. Richards and Edward J. Taubensee are associated with him, having been identified with the Taubensee & Richards organization for ten and eight years, respectively.

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J. M. Watson Jr. has been appointed district sales representative for the Empire Sheet & Tin Plate Co., Mansfield, O., with headquarters in the First National bank building, Youngstown, O., where for the past ten years he has operated a sheet steel sales office.

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Dennis E. Benbow, until recently superintendent of the sheet and jobbing division, Bethlehem Steel Co., Sparrows Point, Md., has become superintendent of sheet mills with the Australian Iron & Steel Ltd., and will sail from San Francisco Dec. 20 for Sydney, Australia, to assume his new duties immediately.

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John C. Taylor, vice president in charge of sales, Taylor-Wharton Iron & Steel Co., High Bridge, N. J., has been elected a director of Taylor-Wharton and associated companies.

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Charles F. Norton, formerly vice president and general manager of the Howell Electric Motors Co., Howell, Mich., has been appointed general sales director of the Louis Allis Co., Milwaukee, motor manufacturer.

Charles F. Norton

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D. J. Reese, Whiting Corp., Harvey, Ill., has been elected president of the Chicago Foundrymen's club for the coming year, succeeding Gottfrid Olson.

Other officers elected include: Vice president, William Cureton, W. A. Jones Foundry & Machine

(*Please turn to Page* 56)

EDITORIAL

Pressure for Low Costs Will Aid Demand for Equipment

WITHIN a few weeks, industry will be engaged in closing its books for 1933. To the majority of producers, fabricators, distributors and manufacturers in the iron, steel and metalworking industries, it already is a foregone conclusion that the volume of business in the current year will exceed that of 1932 by an appreciable margin. In some cases, the volume of 12 months of 1932 was matched in the first eight or nine months of 1933.

Unfortunately this gratifying record is not shared uniformly throughout the industry. For hundreds of companies, the volume of business booked in 1933 will fall below that of 1932. Many of these concerns did not benefit from the sharp upturn in industrial activity, which carried the federal reserve board's index of industrial production from 60 in March to 100 in July. In fact, scores of establishments—far from benefiting from the recovery movement—actually have suffered from it.

Heavy Equipment and Machinery Industries Have Not Shared in Business Upturn

Most of these unfortunates are found in the heavy equipment branch of industry. Their plight was intensified when NRA administrators, early focusing their attention upon the problem of stimulating re-employment, virtually turned their backs upon opportunities for restoring jobs in the equipment industries and concentrated their attention upon consumers' goods industries. The second serious handicap to equipment builders arose from the uncertainty of our monetary policy, which, heaped upon an already impossible credit situation, practically choked off the investment of private capital in heavy machinery and equipment.

These are the principal reasons why the number of heavy, overhead cranes built in 1933 can be numbered on the fingers of one hand; why the ordering of material handling equipment such as car dumpers, ore bridges, power shovels, etc. had practically ceased; and why aids to more efficient material handling within plants, such as hoists, trucks, conveyors, etc. have been in sluggish demand.

Improvement in this hard-pressed branch of industry will depend upon two major factors.

The first is the proper incentive for the investment of private capital. This involves a clarification of the status of the dollar; a better understanding of, or modification of the securities act; a determination of government policy as to private or government ownership of certain services; and numerous other measures necessary to restore confidence in investments in industry. A complete and lasting solution of this problem is essential to a continuation of the present improvement in business generally.

The second major factor is the pressure for economical production and manufacturing, which even now is building up a hidden demand for efficient machinery and equipment.

For some strange reason, management has been slow to grasp the full import of the NRA influence upon costs and selling prices. There is a disposition among code members in the production and manufacturing industries to assume that the code is a device enabling them to pay higher wages and to pass the increased cost on to the consumer. Indeed, there is a serious danger that this policy will lead to restriction of demand, unless industry awakes quickly to the realization that even a code cannot condone prices based upon inefficiency. Pursuit of the present policy will result in adjusting prices to suit the requirements of the highest-cost producers and manufacturers. Consumers will not stand for this, nor will low-cost producers be willing to hold a high-price umbrella over the heads of their high-cost competitors.

Ascendancy of Low-Cost Producer Will Revive Demand for Efficient Equipment

Right now powerful pressure is being generated, which, when released in a few months, will hit high-cost operators with tremendous force. The only escape from it will be that afforded by efficient management and low-cost equipment. Recently a study of 30 code members in an eastern industrial district showed that only six of them were giving any thought to reducing the cost of production or manufacture through improved methods and facilities.

Do not think that the consumer is unaware of this condition. He is holding his fire, but if pressed too far, he will rise up in a protest that will make the recent attacks of union labor appear mild in contrast.

Temporarily NRA is giving the high-cost plant an advantage, but this will not continue long. The efficient plant will come into its own quickly, and with it will be launched a renewed demand for labor-saving machinery and equipment.

THE BUSINESS TREND

Ayres' Prediction for 1934 Not As Gloomy as It Sounds

AT A time when each new day is bringing additional signs of impending improvement in business, Col. Leonard P. Ayres' prediction that "1934 will be another year of depression" will strike a discordant note in the minds of many industrial executives.

However, the Cleveland banker's preview of 1934 is not as gloomy as it appears on the surface. He expects that the physical volume of production "will not be as great in any one month as it was in July of 1933, or as small as it was in March." Steel ingot production, within the upper limits of this prediction, could attain a total of 35,000,000 tons. This is not far short of the 40,000,000-ton figure being mentioned by many executives in the steel industry.

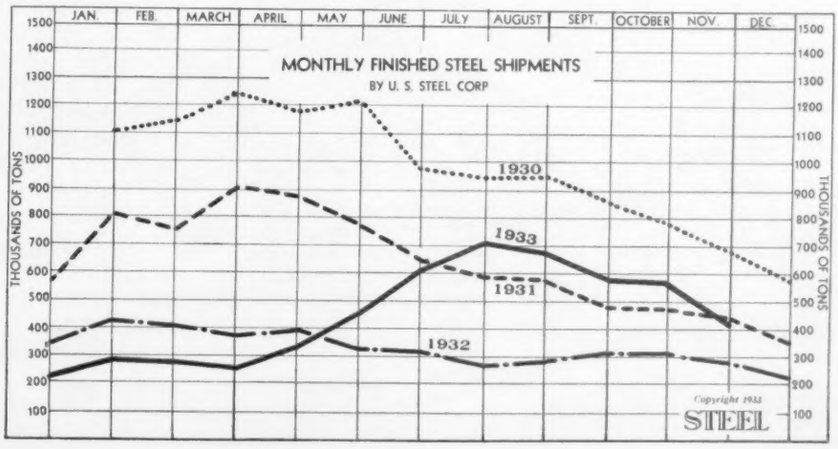
According to the Ayres' formula, automobile output in 1934 will not exceed 2,750,000 units. This is considerably short of the 3,500,000 estimate submitted by conservative observers in the motor car industry and decidedly out of range with the 4,000,000 figure ventured by the more optimistic prognosticators.

A 35,000,000-ton year in steel and a 2,750,000-car year in automobiles, which are within the limits of Colonel Ayres' prediction, would be fairly good years in comparison to 1932 and 1933.

Industrial executives will applaud the Colonel more for his treatment of the durable goods industries than for his prediction. Especially apt is his declaration that "our depression problem will be solved when we put back to work the 5,000,000 idle people who would normally be engaged in the durable goods industries, and keep them employed by private enterprise."

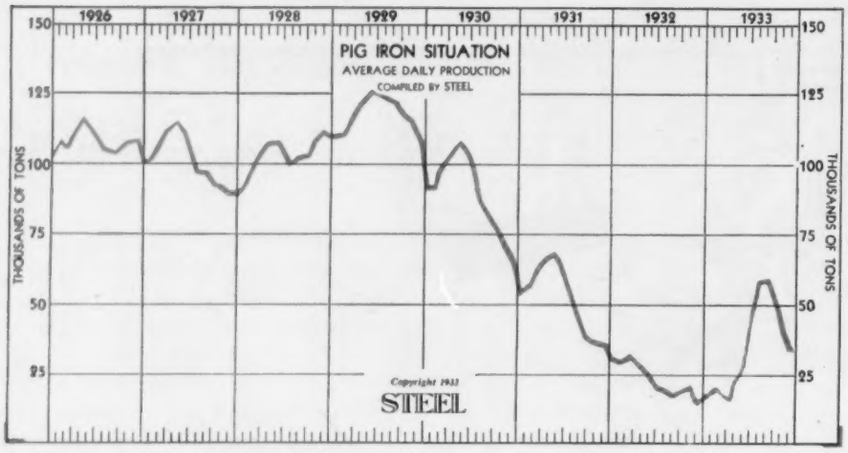
Record of Shipments by United States Steel Shows Low Point Was Last December

With its report of November shipments of finished steel, United States Steel Corp. released figures which carry the monthly series back to the beginning of 1930. It is interesting to note that shipments for each of the last seven months in 1933 were in excess of the best month in the year 1932, which was January. Shipments for December, 1932, amounting to only 227,576 tons, were the smallest in the entire period of 47 months.



1933	Tons
Nov.	430,358
Oct.	572,897
Sept.	575,161
Aug.	668,155
July	701,322

1932	Tons
Nov.	275,594
Oct.	310,007
Sept.	316,019
Aug.	291,688
July	272,448



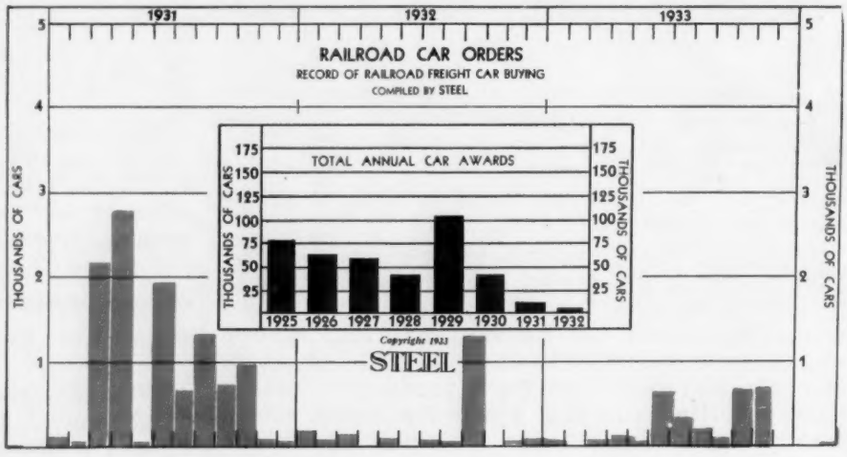
November, 1933	36,627
October, 1933	43,824
November, 1932	20,858

Pig Iron Production Down 16 Per Cent in November

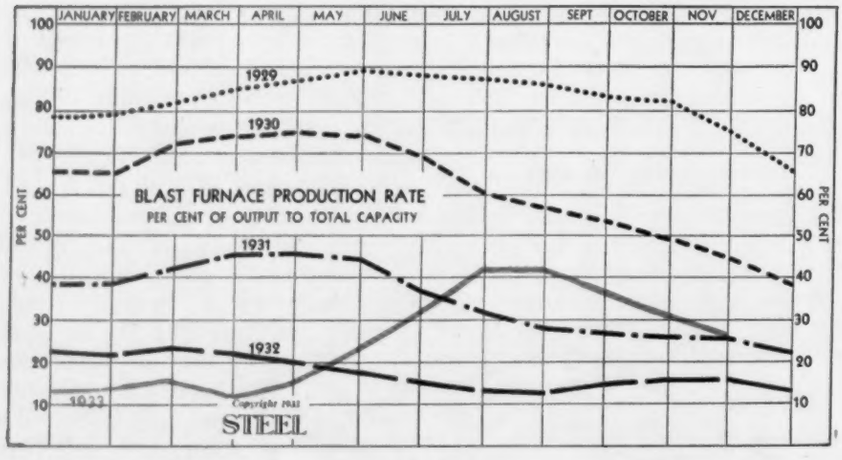
Production of coke pig iron in the United States declined 16.4 per cent in November, bringing the daily rate down to the lowest since May. During November, iron was made at an average daily rate of 36,627 gross tons, which, against the 43,824-ton rate of October, was a loss of 7197 tons per day. Since August, when the daily rate of 59,137 tons reached the highest point this year, the trend has declined over 60 per cent.

November Freight Car Awards Show Gain Over Last Year

Domestic freight car awards during November totaled 533 units, bringing the total for the eleven months to 2144 cars. A year ago in November only 2 awards were made and during the eleven-month period only 1689 cars were produced. While freight car awards have shown an increase over last year there is still room for improvement when compared with the 42,417 and 10,694 units produced during the eleven months of 1930 and 1931 respectively.



November, 1933	533
October, 1933	514
November, 1932	2



Blast Furnace Rate Down as 4 Furnaces Are Dropped

With the total output of pig iron showing a decline of 259,725 tons in November, four more blast furnaces were dropped. This brings the total of 81 furnaces active on Oct. 31 to 77 on the last day of November. Relating production to capacity, operations during the eleventh month were at a rate of 26.6 per cent, against 31.8 per cent in October and 14.7 per cent in November, one year ago.

	Per Cent
November, 1933	26.6
October, 1933	31.8
November, 1932	14.7

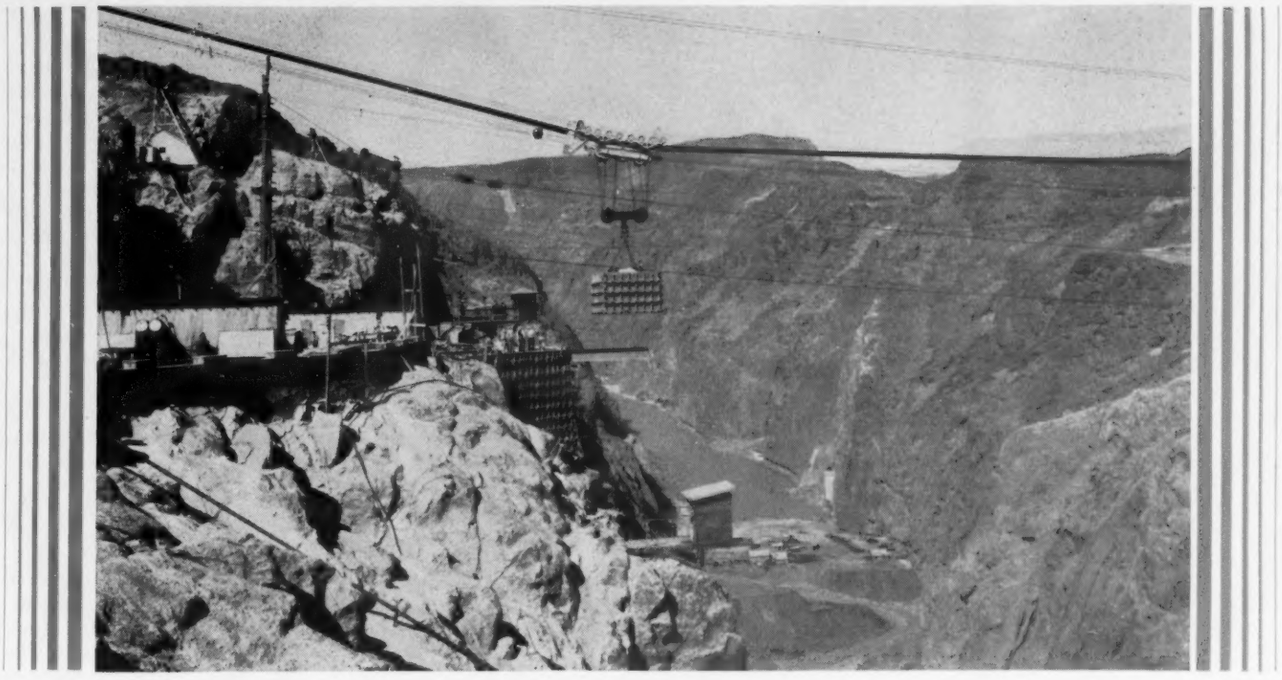


Photo courtesy Six Companies Inc.

Start of test run on 150-ton government cableway. Heavy steel tunnel segments are lowered from this cableway to landing ledges about 500 feet below

How Steel Aids In Harnessing Colorado River

BY A. H. ALLEN
Associate Editor, STEEL

REPRESENTING probably the greatest engineering achievement of modern times, Boulder (ex-Hoover) dam will stand as a monument to the effectiveness of present-day methods and materials in harnessing the tremendous latent forces of nature. Steel, concrete and technical resourcefulness are co-operating to speed the project to completion ahead of schedule.

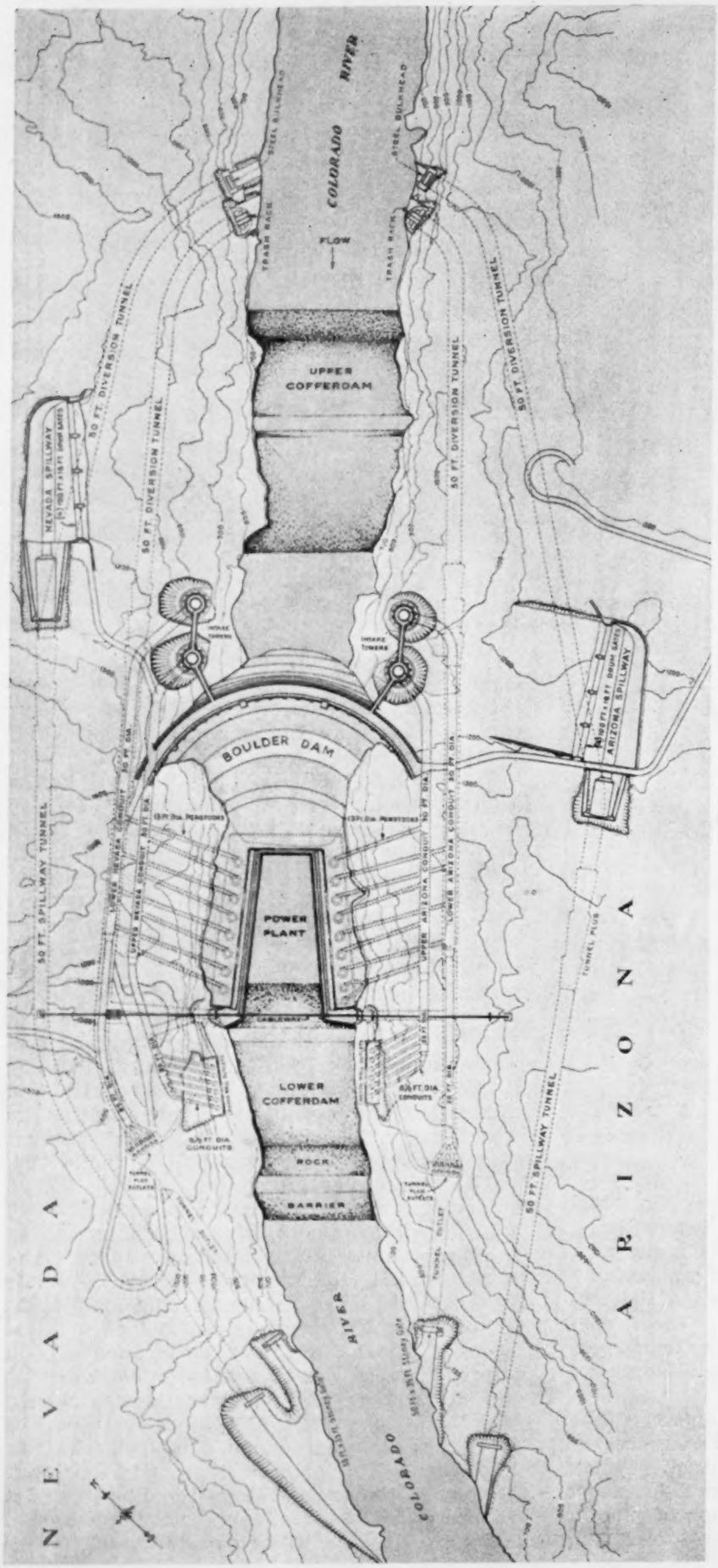
One of the most interesting phases of the development is the large amount of accessory construction and equipment required. Thirty miles of railroad trackage, a large fabricating plant to assemble and test sections of pipe, a completely equipped city to house workmen, large-scale concrete mixing and gravel screening plants, and numerous canyon cableways comprise a few of the adjuncts to the actual construction of the dam.

When completed in 1937, the dam will be the highest and largest ever constructed. It is to be of the arch-gravity type, 45 feet thick at the top, 650 feet thick at the base, and will rise about 730 feet above the foundation rock. Its length along the top will be 1180 feet.

General contract for the dam construction was awarded in 1931 to an organization known as Six Companies Inc., Boulder City, Nev., formed jointly by six western contractors, engineers and builders—Utah Construction Co., Bechtel & Kaiser, MacDonald & Kahn Co., Morrison-Knudsen Co., J. F. Shea Co., and Pacific Bridge Co. Six Companies' bid for construction of the dam, power plant and appurtenant works was $48,890,995. The entire project involves expenditure by the government of $165,000,000.

The dam proper will contain about 3,400,000 cubic yards of concrete masonry, and 1,000,000 cubic yards more will be used in constructing the power house and related structures. The total quantity of concrete, 4,400,000 cubic yards, would be sufficient to build 2255 miles of highway, 20 feet wide and 6 inches thick. Reinforcing steel to the extent of about 17,000 tons is required for this concrete work.

Engineering and construction problems which must be solved in building a dam of this size are of a magnitude and complexity difficult to realize. For instance, it is estimated that, because of the great mass of the dam, the heat generated by the chemical reaction accompanying the setting of the concrete would not be



dissipated for over 100 years under natural conditions.

In order to remove this heat quickly, and permit grouting of the construction joints in the dam at low temperature, artificial cooling will be employed by forcing cold water through a system of pipes embedded in the concrete. This system will require about 800,000 feet, or about 150 miles, of 2-inch pipe. When the cooling process has been completed, this piping will be filled with grout under pressure and thus become a solid and integral part of the dam structure.

The reservoir created will be the largest artificial lake in the world, measuring 115 miles in length and ranging from a few hundred feet at the dam to 8 miles in width. When filled, it will contain over 30,000,000 acre-feet, or about 11,000,000,000,000 (eleven trillion) gallons, of water, enough to cover the state of Connecticut to a depth of ten feet. Under normal flow conditions it will require over two years to fill the reservoir.

Tunnels Divert River

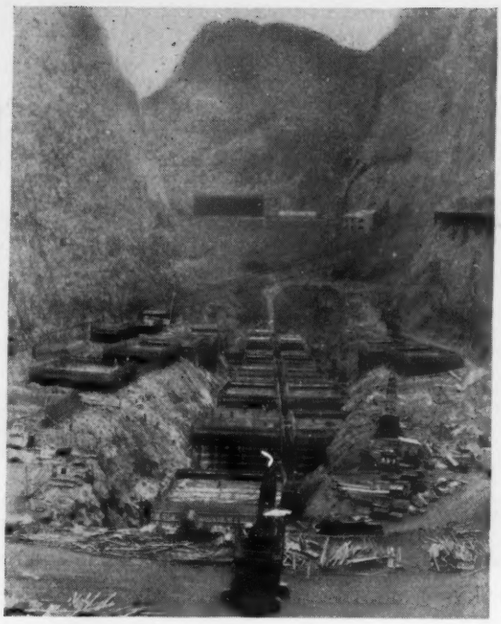
While the dam is under construction, the Colorado river is being diverted through four 50-foot diameter, concrete-lined tunnels driven through the canyon walls, two on each side of the river. These four huge tunnels have a total length of about 16,300 feet, or more than 3 miles.

When their use for diversion is no longer necessary, the two outer tunnels will be used for the discharge from two spillways, and the inner tunnels will accommodate steel pipes leading to the powerhouse and tunnel plug outlet works. Two additional power tunnels, 37 feet in diameter, one on each side of the river, also are being driven through the rock walls of the canyon.

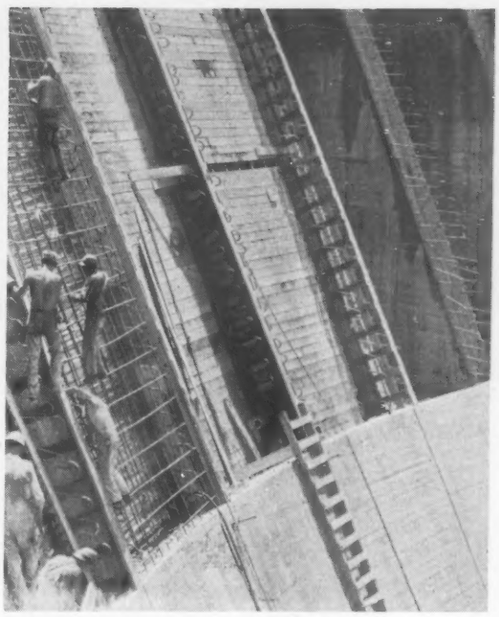
The power plant will be capable of developing 1,835,000 horsepower. For purposes of comparison, it might be stated that the Niagara plant (United States) has a capacity of 557,500 horsepower; Conowingo, 378,000 (ultimate 594,000) horsepower; and Muscle Shoals, 250,000 (ultimate 600,000) horsepower. The continuous firm output of the Boulder dam power plant will be in excess of 663,000 horsepower.

The sale of electrical energy will, on the basis of present contracts, pay all operating and maintenance costs,

TOPOGRAPHICAL sketch of Boulder dam, showing general arrangement of the tunnels and power house. River bed is excavated to a depth of 140 feet, to provide a bedrock foundation for the dam, which will raise the surface of the river 582 feet. Courtesy Babcock & Wilcox Co.



LOOKING across the dam (left) from the upstream cofferdam. The 8-foot slot through the central foundations will accommodate cooling system headers, necessary to dissipate heat generated by setting concrete. At the right, workmen are setting steel reinforcing in buttresses of the channel lining forms of the Arizona spillway. Photos courtesy Bureau of Reclamation



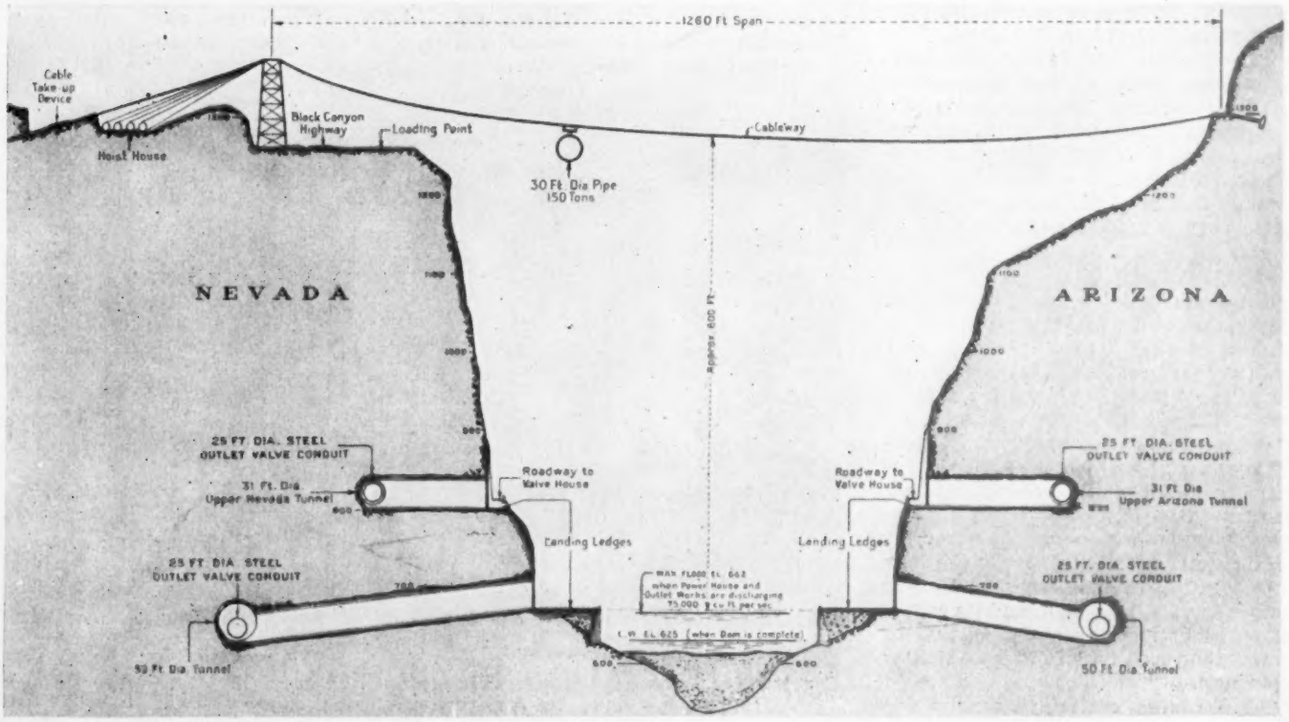
interest charges, and will amortize the investment over a period of 50 years.

Contract awarded the Babcock & Wilcox Co., New York, includes the fabrication and installation of fusion-welded plate-steel pipes in the hydraulic-power and outlet-works tunnels at a cost of over $10,000,000. This contract involves such features as the construction of pipes larger than any heretofore made, the transportation and handling of pipe sections as heavy as many types of standard-gage railroad locomotives, and the examination of welded seams by X-ray equipment of a capacity and power made available only recently.

Four main conduits will lead water from intake towers above the dam to the power-house and outlet works regulating valves below the dam. There will be one upper and one lower conduit on each side of the river. The lower conduits will be located in the 50-foot diversion tunnels nearest the river and at an elevation just above the normal low-water level of the river below the dam. The upper conduits will be installed in 37-foot diameter tunnels running parallel to, and 170 feet above, the lower tunnels.

From each of the main conduits, which are 30 feet in diameter, there will be four 13-foot diameter branches leading to 17 hydraulic turbines in the power house. Below the penstock branches, the main conduits

CROSS-SECTION sketch showing location of the 150-ton cableway, landing ledges and construction tunnels through which the steel pipes will be transported into the main tunnels. Courtesy Babcock & Wilcox Co.


1260 Ft Span
Cable Take-up Device
Hoist House
Black Canyon Highway
Loading Point
Cableway
30 Ft. Dia Pipe 150 Tons
NEVADA
ARIZONA
Approx 600 Ft.
25 FT. DIA. STEEL OUTLET VALVE CONDUIT
31 Ft. Dia Upper Nevada Tunnel
Roadway to Valve House
Landing Ledges
25 FT. DIA. STEEL OUTLET VALVE CONDUIT
50 Ft. Dia Tunnel
MAX FLOOD EL. 662 when Power House and Outlet Works are discharging 75,000 Cu Ft per sec
C. L. EL. 625 (when Dam is complete)
Roadway to Valve House
Landing Ledges
25 FT. DIA. STEEL OUTLET VALVE CONDUIT
31 Ft. Dia Upper Arizona Tunnel
25 FT. DIA. STEEL OUTLET VALVE CONDUIT
50 Ft. Dia Tunnel

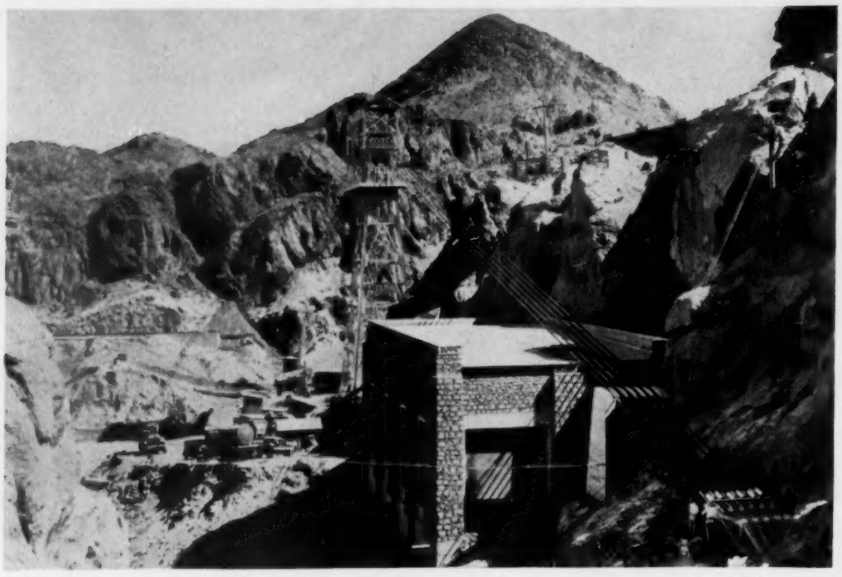


Photo courtesy Six Companies Inc.

Hoist house and Nevada anchorage for 150-ton main cableway. Appreciation of distances can be gained by noting size of men standing beside cable anchorage

will be reduced to 25 feet in diameter, and from each of these there will be six 8½-foot diameter branches leading to control valves located down stream from the power house. These valves will be used to regulate the flow, to the river below the dam, of surplus water not needed for the power turbines.

Approximate sizes of the various pipes to be fabricated are:

Length, feet	Diameter, feet	Plate thickness, inches
4700	30	1¾ to 2¾
1900	25	1 1/16 to 2⅜
5600	13	1 to 1⅝
2300	8½	⅞ to 1

More than 50,000 tons of steel plate will be used in fabricating this 14,500 feet of pipe.

Two pieces of 30-foot diameter pipe, each about 12 feet long, when welded together will comprise an erection-section which, with support brackets and stiffening rings to hold the pipe in shape, will weigh, when made of plate of the maximum thickness required, about 150 tons.

Lowered From Cableway

Sections will be transported from the fabricating plant to the rim of the canyon on special trucks or carriages comparable in load-carrying capacity with those used for mobile coast-defense guns. A cableway extending across the canyon will provide means by which the 150-ton sections may be lowered about 600 feet to landing ledges cut into the canyon walls on both sides of the river, at the construction entrances to the four tunnels. This cableway will have a clear span of 1260 feet, and its capacity will be more than double that of any other used to date for any similar purpose.

While this cableway, constructed by the Lidgerwood Mfg. Co., Elizabeth, N. J., is intended primarily for lowering the pipe sections, it is also being used by the contractor for lowering miscellaneous machinery and material. Design calls for lowering 50 to 150 tons, and raising 40 to 150 tons at a speed of 30 feet per minute; also for lowering loads up to 50 tons and raising loads up to 40 tons at 120 feet per minute. Conveying speed for all loads is approximately 240 feet per minute.

Six main cables are provided, with 3-inch diameter cable of locked-coil construction supplied by the American Steel & Wire Co., Chicago. Exterior wires of the cable interlock to produce a smooth, cylindrical surface. The cable weighs 22 pounds per lineal foot and has a breaking strength in excess of 500 tons. Each end of each cable is zincked to a roller bearing swivel socket, which permits the cable to be turned at intervals in order to distribute the wear uniformly.

Each cable is provided with combination mechanical and hydraulic jack takeup at one end. Two hoisting ropes will be used, each with eight-part multiple purchase.

Mammoth Hoist Drums

Two electric lifting hoists are installed, each with single fixed drum 13 feet in diameter, and one electric conveying hoist with single fixed drum 8 feet in diameter. The lifting hoist drums are of welded rolled steel plate, 2 inches thick, 8 feet wide and 42 feet long, weighing 90,000 pounds each. Each hoist is driven by separate motor, the motors for the lifting hoists being 175 horsepower, 225/900 revolutions per minute; for the conveying hoist 400 horsepower, 450 revolutions per minute. All motors are of the direct-current type operating on the variable voltage system, including motor-generator set and full magnetic control with overload and overspeed protection.

The loading point is on the Nevada side, on which side is located the hoist house and the head tower, 100 feet high and of steel construction, as shown in an accompanying illustration. At the Arizona side the main cables are supported by a saddle embedded in concrete on the rock surface, no tower being required.

Anchorages at each end are of massive construction, comprising steel eye-bars sunk in concrete, the eye-bars runing back into a rock tunnel a distance of about 60 feet.

Control of the cableway is divided between operators—one located near the head tower on the Nevada side

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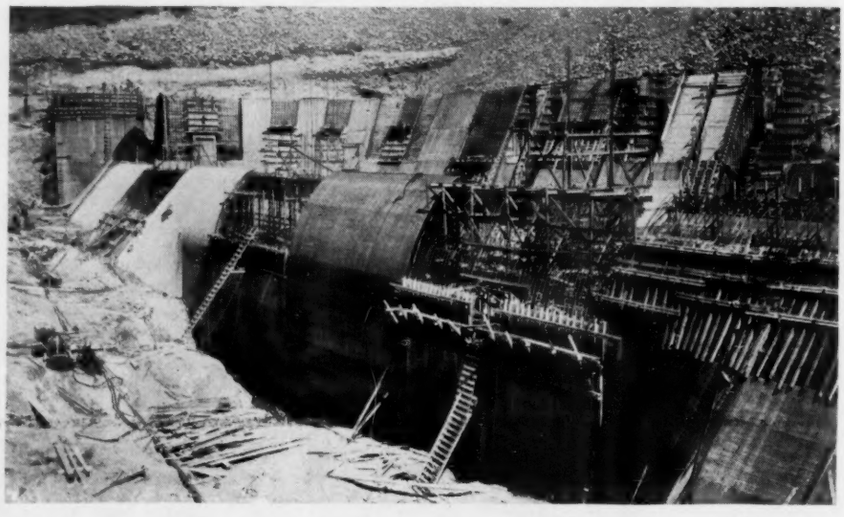

Photo courtesy Six Companies Inc.

Construction work on Arizona spillway (see map on p. 22) showing appearance of buttress type of channel lining

Engineers Probe Economics Of Milling vs. Planing

ECONOMICS of planing versus milling in metal cutting, discussed in three papers at the recent annual meeting of the American Society of Mechanical Engineers in New York, made a place for both for various types of work. A. C. Danekind, assistant to manager, General Electric Co., Schenectady, N. Y., declared that a survey of his company's records reveals that many jobs have been transferred from a planer to a milling machine, but in no single instance do the records indicate the changing of a job from a milling machine to a planer for purely economic reasons. Nature and characteristics of the material being machined are important factors. Mr. Danekind stated milling-machine operating maintenance is more complex and costly than that of a planer, while the cutting tool cost for a planer is small compared to cutter costs for operating a milling machine.

As compared with milling cutters, reconditioning a planer tool is simpler and is usually performed by the operator. Milling cutters, however, must be reground by skilled mechanics, employed usually only for that purpose. Mr. Danekind declared the great single recommendation for the operation of a planer is its broad flexibility. For that reason, Mr. Danekind stated, the planer will alalways be a real factor in general machine shop practice.

Cost Deterring Factor

R. E. W. Harrison, chief engineer, Cincinnati Grinders Inc., Cincinnati, claimed the milling machine had largely displaced the planer on small work, has made inroads on work of medium weight, and that in many cases only the fact that heavy planing equipment is already installed and the investment to a large extent amortized, prevents even larger adoption of the milling machine process. He stated that records of installations during the last three years, with machine tool investments carefully checked, clearly show a preference in favor of the milling machine process.

Comparison between the planer and milling machine should be made only with machines of modern design, according to F. E. Cardullo, chief engineer, G. A. Gray Co., Cincinnati. Most planers and many milling machines now in use are obsolete in design. Planers are more versatile and are, therefore, superior when there is a variety of work and the lots are small. The planer, he said, was often neglected by the design and production engineering departments.

In the overlapping field between the planer and milling machine, the former is economically superior when working on large parts when the material is unusually strong and tough. The milling machine has the advantage on small parts when the material is relatively soft. Mr. Cardullo declared that a new type of machine tool, the milling planer, should be considered when the question arises as to whether a planer or milling machine should be bought. This machine can do planing, milling, boring and drilling in the same setting of work and combines operating and economic features of both.

Stress concentration produced by holes and notches as involved in machine design, were discussed in a paper by A. M. Wahl and R. Beeuwkes, Westinghouse Research Laboratories, East Pittsburgh, Pa. Results were presented of investigations concerned primarily with the case of a bar in tension having either a centrally located hole or two symmetrically located semicircular notches.

Creep and Fatigue Properties

Contrary to the general opinion that all "unstabilized" 18-8 chrome-nickel steel of carbon content over 0.02 per cent shows embrittlement as judged by room temperature impact tests after prolonged heating under load at 1100 to 1400 degrees Fahr., a low-carbon heat, cast or wrought, water quenched or air quenched, showed absolutely no reduction in impact resistance on test after being subjected to load at 1000 to 1200 degrees Fahr. for periods of the order of 750 to 1750 hours. This conclusion was reached in tests of high temperature creep and fatigue properties of cast and wrought high and low carbon 18-8 steel from split heats. No certain explanation for this lack of embrittlement was established in the paper, covering the report of the joint A. S. M. E. and A. S. T. M. research committee on the effect of temperature on properties of metals, and prepared by H. C. Cross, Battelle Memorial institute, Columbus, O.

A comparison was made chiefly at 1000 to 1200 degrees Fahr. of the resistance to prolonged loading and to repeated stress of steels with 18 per cent chromium, 9.5 nickel, 0.5 manganese, 0.6 silicon, with carbon contents of 0.067 and 0.125 per cent. These steels, of both high and low carbon content, were studied in both cast and wrought conditions and no stabilizing elements were employed. Split induction furnace heats were poured into ingots for rolling and into castings. Both cast and wrought materials were water quenched from 2000 degrees Fahr. Thus material of known melting history and of identical composition was available, both fine and coarse grained, rolled and cast.

Stresses for failure by fatigue in the temperature range studied were far higher than creep stresses for elongation of 1 per cent in 10,000 hours. A larger number of cycles was required to establish the endurance limits at high temperatures, on cast than on wrought material. The room-temperature tensile strengths of the wrought materials were roughly 25 per cent higher than those of the cast materials, and those of the high-carbon lot somewhat higher than those of the low-carbon. In both fatigue and creep tests, high-carbon wrought was at the head and low-carbon at the foot of the list in load-carrying ability. Carbon had a strengthening effect on creep and fatigue resistance of these steels, in line with published information.

Order Same at High Temperature

The order of strength of the materials as shown in room-temperature tests carried through the high-temperature tests, wrought material being stronger than cast, though the creep resistance of the two was not much different at 1200 degrees Fahr. The generalization, sometimes stated, that coarse-grained cast material has superior creep resistance to fine-grained wrought material was not borne out in this case. In creep tests, the cast materials were characterized by higher initial deformation than the wrought.

Some bars of cast high-carbon fractured in creep tests with little elongation. Much of the high-carbon cast and wrought material came through creep tests of similar periods and temperatures without notable loss of impact resistance. It is possible to have wrought 18-8 steel of high-carbon content and without stabilizing elements that still has 85 to 105 foot-pounds Izod impact strength after 1500 hours under load at 1000 to 1100 or 1200 degrees Fahr.

The fracture of high-carbon cast bars at low elongation was not necessarily accompanied by low impact, some figures at 100 foot-pounds being obtained on specimens from the unbroken portion of a fractured creep bar. The lowest individual impact figures on high-carbon specimens after creep test were 63 foot-

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The Plastic Forming Of Metals

By PROFESSOR DR.-ING. ERICH SIEBEL
Translated by JOHN H. HITCHCOCK

Part II—Forces and Flow of Material in Technical Forming Processes

3. Phenomena of Flow in Rolling

PREREQUISITES for a complete calculation of the flow of material are that the stress condition in the roll opening be known, and that it be amenable to calculation. A complete mathematical calculation of this stress condition cannot be made at present. However, as the following derivations show, a conception of the stress distribution within the roll opening can be obtained by an approximate calculation based on assumptions which greatly simplify the problem. This representation can perform a useful service by explaining many of the phenomena which occur during rolling.

If it be assumed that the material displaced from the thickness of the bar during rolling flows out only in the direction of the bar axis, and if lateral spreading accordingly is temporarily ignored; the frictional force, which is produced on each element of contact area between rolls and bar and which acts in the tangential direction opposing the flow of the displaced material can be set equal to the product of μ (coefficient of friction) and the normal force at the point in question. An element of contact area is considered, which has unit width and length dx, and which is located by the angle of inclination α, as shown in Fig. 45. If the normal stress at this point is designated by σ,

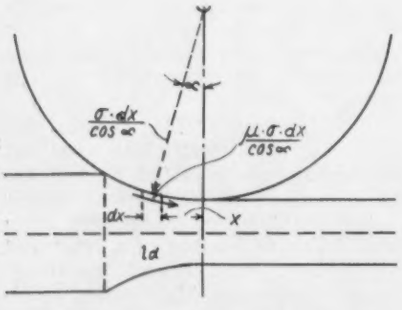


Fig. 45—Forces in area of contact between rolls and rolled material

the force dH exerted by each roll in the direction of the axis of the bar is determined by the relation:

$$dH = \sigma \times \frac{dx}{\cos \alpha}(\mu \cos \alpha - \sin \alpha) = \sigma \times dx \, (\mu - \tan \alpha)$$

if the movement of the bar relative to the rolls is directed toward the entering side. If the direction of relative movement of the bar is toward the delivery side, the relation becomes:

$$dH = \sigma \times \frac{dx}{\cos \alpha}(\mu \cos \alpha + \sin \alpha) = \sigma \times dx \, (\mu + \tan \alpha).$$

Considering the fact that the normal stress, which is applied to the outer

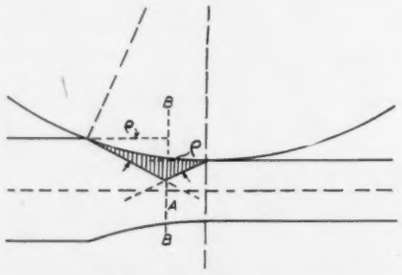


Fig. 46—Representation of forces applied to bar in direction of its axis

surface of the bar, cannot differ greatly from the deformation strength of the material, and setting $\mu = \tan \rho$ (ρ = friction angle), the total longitudinal force which opposes relative movement in one direction or the other, at a distance x from the roll entrance or the roll exit, is expressed by the approximate equation:

$$H = k_f \int_0^x (\tan \rho \mp \tan \alpha)\, dx + H_o \quad \ldots\ldots (34),$$

in which H_o represents the longitudinal force acting ahead of or behind the rolls.

In normal operation, there are no longitudinal forces outside the roll opening. Internal force effects will not be considered here. At both ends of the region of contact, both the longitudinal force H and therewith the force H_o accordingly must be equal to zero. However, this limiting condition can be fulfilled only if the relative movement of the bar with respect to the roll surface is opposite to the direction of rolling in the zone of early contact, and in the direction of rolling in the zone near the delivery side.

The integral $\int_0^x (\tan \rho - \tan \alpha)\, dx$ can be represented as shown in Fig. 46. A straight line, at an angle ρ from the horizontal (ρ = friction angle), is drawn from the point of first contact between roll and bar. The distance from any point on this line to the circle representing the roll surface, measured perpendicularly to the axis of the bar, indicates graphically the value of the above integral at that point.* A similar construction can be used for the integral $\int_0^x (\tan \rho + \tan \alpha)\, dx$, for the relative movement of material in the opposite direction. A corresponding line is drawn, at the same angle ρ from the horizontal, but in the opposite direction, from the end point of the arc of contact. The plane. B-B, which passes through the point of intersection of these two lines, and which is perpendicular to the axis of the bar, must then form the

*See footnote next page.

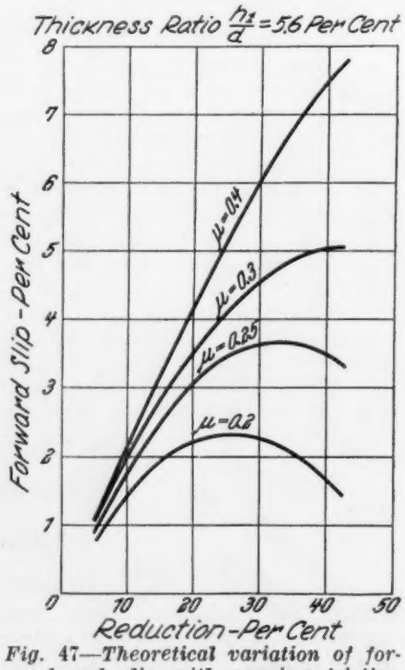


Fig. 47—Theoretical variation of forwardward slip with varying friction between rolls and rolled material

neutral plane at which the direction of the relative movement between roll surface and bar is reversed. Ahead of the neutral plane, B-B, the material displaced by the rolls flows opposite to the rolling direction, and the entering velocity of the rolled material is therefore correspondingly smaller than the peripheral velocity of the rolls. Beyond the neutral plane, the displaced material can flow out only in the direction of rolling, so that the delivery speed of the bar exceeds the peripheral velocity of the rolls. This phenomenon, which is known as forward slip, accordingly is stipulated by the relations of force equilibrium in the region of contact. The forward slip then must correspond to the relative reduction in the thickness of the bar from the neutral plane to the point of delivery.

The position of the neutral point, and therewith the forward slip, as the graphical construction indicates, are influenced to a great extent by the magnitude of friction between rolls and bar. In Fig. 47 the forward slip relations (which according to the foregoing theory are to be expected for the rolling of bars having a final thickness of 0.39-inch between rolls of 7.09 inches diameter) are shown as a function of the reduction per pass and the coefficient of friction. The illustration indicates that the forward slip diminishes rapidly with decreasing roll friction, and that with a given coefficient of friction, a certain maximum value of forward slip cannot be exceeded. An experimental check of the theory discloses that the forward slip relations are well represented qualitatively by the theoretical curves. In particular, by means of cold rolling tests with rolls having various degrees of surface roughness, E. Siebel and E. Osenberg[48a] were able to show that the forward slip increases with increasing surface friction. The forward slip accordingly appears to be an excellent criterion of the frictional relations in the region of contact.

Importance of Rolling Temperature

For the experimental determination of forward slip in the hot rolling of mild steel, the tests of E. Kirchberg[39] and W. Trinks[49], and particularly the tests which J. Puppe has carried out on this subject, are significant. The latter investigator was able to show that the rolling temperature is of fundamental importance in determining the magnitude of forward slip, because the forward slip increases rapidly with falling temperature. More recently, extensive tests on forward slip in the hot rolling of soft steel were conducted by E. Siebel and E. Fangmeier[47], in which the effects of reduction, temperature, and ratio of thickness of rolled material to roll diameter were determined. The results of this investigation are reproduced in Figs. 48 to 50. Although, assuming equal values of reduction, the forward slip between 1292 and 1652 degrees Fahrenheit varies only slightly, the values of forward slip at higher temperatures become much smaller. A comparison with Fig. 47 indicates the probability that a diminution of the roll friction with increasing temperature of the bar is the reason for the described phenomenon. Fig. 47 shows, in addition, that even an insignificant change of the frictional relations affects the forward slip considerably. The wide scattering of the experimental values of forward slip, as well as the different type of forward slip, which is found in the rolling of alloys, thus are explained.

If the conditions which determine the longitudinal forces in the region of contact are known, the factors which determine the gripping relations can be derived easily. As long as the angle of contact α (see Fig. 51, a and b) is smaller than or equal to the friction angle ρ, there is always a drawing-in component of force on the entrance side of the rolls, which acts in the direction of the axis of the bar. The bar thereby is gripped by the rolls without further assistance, and is pressed through the pass. However, if such a severe reduction is selected that the angle of contact exceeds the friction angle, the rolls can no longer grip the bar spontaneously; because the longitudinal forces in the forward part of the contact region become negative,

[48a] E. Siebel and E. Osenberg: Ueber den Einfluss der Reibung und der Querschnittsabmessungen auf den Materialfluss beim Walzen; Mitt. K. W. Inst. fuer Eisenforsch. 15 (1933).

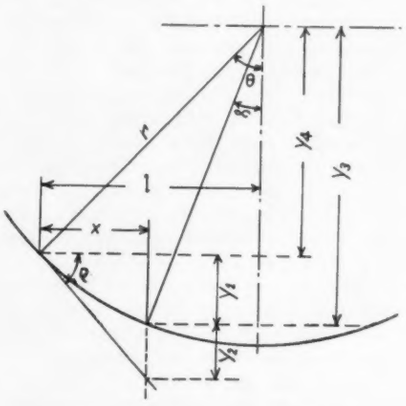
[49] W. Trinks: New Theories on Hot Mill Deformations Obtained by Experimental Rolling: Blast Furnace & Steel Plant 49(1915)p.276.

*The proof of this construction is simple, but since it may not be self-evident, it is given as follows:

$$\int_0^X (\tan\rho - \tan\alpha)\,dx =$$

$$\int_0^X \tan\rho\,dx - \int_0^X \tan\alpha\,dx$$

$$\int_0^X \tan\rho\,dx = X \times \tan\rho = y_1 + y_2$$



From the accompanying sketch,

$$X = l - r\sin\alpha$$

Then

$$dx = -r\cos\alpha\,d\alpha$$

Hence,

$$\int_0^X \tan\alpha\,dx = -\int_\Theta^\alpha \tan\alpha \times r \times \cos\alpha\,d\alpha =$$

$$-\int_\Theta^\alpha r \times \sin\alpha\,d\alpha =$$

$$r\cos\alpha - r\cos\Theta.$$

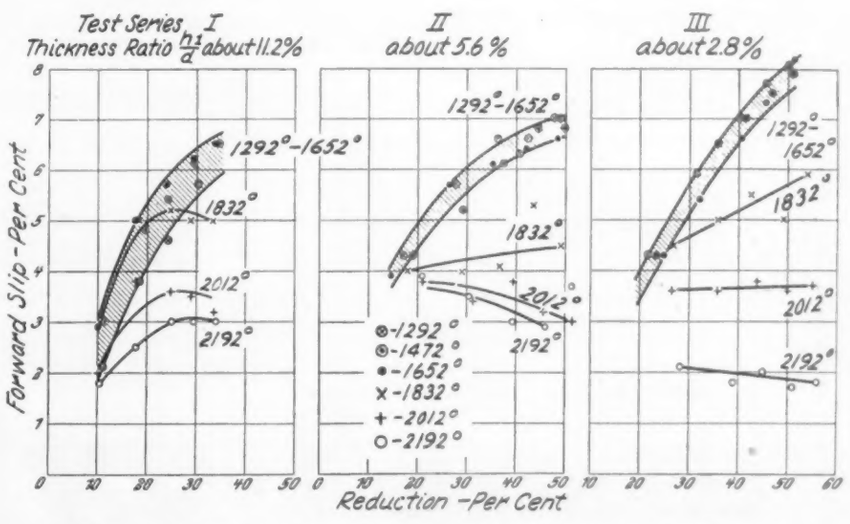
Again referring to the sketch,

$$r\cos\alpha = y_3;\ r\cos\Theta = y_4;$$

and $y_3 - y_4 = y_1$.

Therefore,

$$\int_0^X (\tan\rho - \tan\alpha)\,dx = y_1 + y_2 - y_1 = y_2.$$



Figs. 48, 49 and 50—Forward slip during hot rolling of mild steel

as shown in Fig. 51c, and the bar thereby is repelled. If the angle of contact in this case remains smaller than twice the friction angle, the rolls still can draw the bar through, provided the roling process is once begun by forcible entrance of the bar into the pass; because the longitudinal forces in the rear zone of the contact region are again positive, and a neutral plane comes into existence. Finally, if the angle of contact exceeds twice the friction angle the formation of a neutral plane no longer leads to a real solution within the contact region; that is, the rolling process even after a forcible beginning comes to a standstill immediately when the external forces are removed[51].

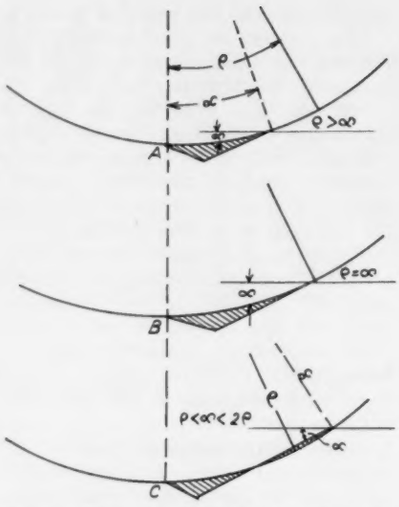


Fig. 51—Gripping and drawing-through of the rolled material

How Pressure Is Distributed

The knowledge of the longitudinal forces furthermore, permits a statement to be made regarding the distribution of pressure in the contact region. If the horizontal forces produced by the effect of both roll surfaces are assumed to be distributed uniformly over the entire area of cross section, Q, the relation:

$$p_H = \frac{2H}{Q} \quad \text{.....(35)}$$

is obtained for the resistance to flow in the longitudinal direction which prevails at each point in the region of contact. This resistance to flow must have an influence upon the vertical pressure p_1 which is exerted against the rolls. According to the shear stress theory, if the direction of rolling and the normal direction are designated as principal stress directions, these two quantities are related by the condition:

$$p_1 = p_H + k_f \quad \text{.....(36).}$$

These relations are represented in Fig. 52 for a case of cold rolling from 0.16 to 0.126-inch (solid lines) and from 0.08 to 0.047-inch (broken lines), with rolls of 7.09 inches diameter. The deformation strength is considered equal to unity, because only the relative value of the separating force is involved. The coefficient of friction is assumed in one case as $\mu = 0.2$, in the other case as $\mu = 0.1$, which values probably correspond approximately to the relations for ground and polished rolls, respectively. The considerable increase of the average vertical pressure (above the value of the deformation strength), which is produced by the friction of the roll surfaces, is clearly shown, as well as the effect of the differing thickness of the bar for equal values of draft. Furthermore, this illustration indicates the advantage which is to be expected from a reduction of the frictional forces, whether such a reduction be accomplished by polishing the rolls or by means of lubrication. The average deformation resistance must drop considerably as a result of either procedure, from which a corresponding increase in the efficiency of the rolling process folows. An experimental check of the pressure distribution in the contact region, by suitable measuring arrangements, shows that the calculated pressure distribution corresponds closely, at least qualitatively, to the true relations as will be shown in Fig. 158.

At present, a complete numerical analysis of the phenomena of lateral spreading cannot be made. In frictionless rolling, if such rolling were possible, each element of volume would be elongated and widened by the same amount during the reduction of thickness performed by the rolls. Because of the friction between material and rolls, however, the flow of material is altered in a manner similar to that of compression. Thus, the shape of the surface of contact between rolls and material favors the flow of material in one direction, and to a greater extent, the more the width of the material and the length of contact differ from one another. Assuming the same shape of contact surface, the elongation and spreading therefore must differ from one another by greater amounts, in the direction of increased displacement of material toward the longer side of the contact surface, the thinner the material and the greater the coefficient of friction.

Flow Resistance Is Reduced

These laws are governed by the influences which arise from the existing curvature of the roll surfaces. The resistance to flow in the direction of increasing distance between the roll surfaces is reduced by the inclination of these surfaces; and this diminution of the resistance is the more pronounced, the greater inclination the roll surfaces have and the less friction exists between rolls and material. In the lateral direction, varying friction can affect the flow resistance only to a much smaller extent, because in this direction the roll surfaces have no curvature. With smooth rolls, the effect is that an increase of friction corresponds in general to an increase of the resistance to flow in the longitudinal direction. With moderate or heavy reductions, an increase of friction therefore produces an increase of spreading. If the working surfaces of the rolls also are inclined in the lateral direction, as in grooved passes, the effect of the inclination of the pass always must be diminished by an increase of friction. With increasing friction, the spreading in an oval pass is therefore greater, whereas it is smaller in a cutting-in pass, if the sides are not too steep.

The effects of friction upon lateral spreading, due to the shape of the contact surface and to the inclination of the roll surfaces, can now act in the same direction or in opposite directions. In the rolling of wide material between smooth rolls, with a roll diameter which is small in comparison to the thickness of the material, or with small reductions, only a small effect upon spreading is to be expected from a change of surface friction.

In hot rolling, the possibility of controlling the frictional relations usually exists only to a limited ex-

[51] H. Sedlaczek: Vorschlage zur Vermeidung des Rauhens der Walzen; St. u. E. 47(1927)p.26.

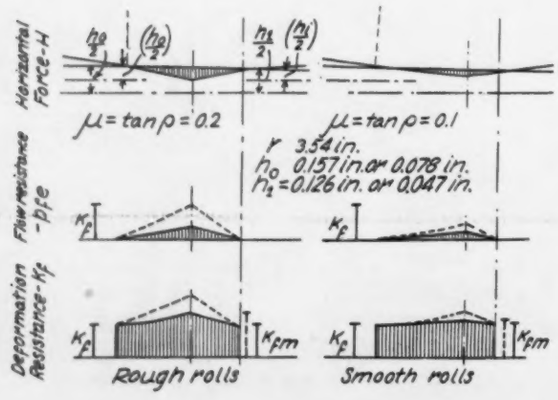


Fig. 52—Stress relations in region of contact between rolls and bar

MOLY

GIVES GREY CAST IRON OUTSTANDING RESISTANCE TO ABRASION

MOLYBDENUM, long famous in the steel industry for making good steel better, is equally valuable to iron founders—producing results not readily duplicated by any other commercial alloy.

It adds a toughness to frictional parts that stubbornly defies wear. It increases tensile strength from 20 to 40% — transverse strength, 25 to 40% — fatigue strength, 25% — impact strength, 50 to 100% — and the Brinell hardness, 10-50 BHN. Yet, a Moly iron will machine *better* at the same Brinell hardness than an unalloyed iron. One foundryman has *doubled* the roughing machining speed on his lathe beds by the addition of 0.50% Molybdenum.

Let us show you how Moly, *at very low cost*, can improve the qualities of both cupola iron and the highest grade electric furnace iron. The modern Climax laboratories in Detroit are at your disposal for any test you care to make. Write for complete information about our free engineering and experimental services and ask for interesting book: "Molybdenum 1933." Climax Molybdenum Co., 295 Madison Avenue, New York City.

CLIMAX Mo-lyb-den-um

tent. A conception of the manner in which the superficial relations of deformation affect the spreading of rectangular sections can be obtained, upon the basis of the experience that the absolute spreading $\triangle b$ is almost independent of the width of the material, as long as the thickness of the material does not exceed its width. Furthermore, it seems probable that the spreading is proportional to the relative reduction of thickness and also to the projected length of contact l_d between material and rolls. Based upon the stated assumption, the following relation then is obtained for the spreading:[41]

$$\triangle b = C \times l_d \times \frac{\triangle h}{h_o} = C\sqrt{r \times \triangle h} \times \frac{\triangle h}{h_o} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (37).$$

The latter form of the expression also indicates the influence of the roll radius, r, upon the spreading. W. Tafel and F. Anke[53] found this relation to be confirmed for the hot rolling of metals. In several rolling tests of steel, in a stand equipped with 17.3-inch diameter rolls, the value of the coefficient, C, was established as 0.31.

[53] W. Tafel and F. Anke: Zur Frage der Breitung bei einigen Nichteisenmetallen; Z. Metallk. 19(1927)p.225.

The results of special tests to determine the spreading during the hot rolling of mild steel[47], in a stand having flat rolls 7.09 inches diameter, are shown in Figs. 53 to 58. Here the observed values of absolute spreading, with final thicknesses of 0.79-inch (I), 0.39-inch (II), and 0.20-inch (III), are plotted against the product of contact length by relative reduction in thickness, as abscissas. The lines drawn among the curve points correspond to the equation:

$$\triangle b = 0.35 \times l_d \times \frac{\triangle h}{h_o}.$$

As the illustrations show, this equation represents the increase in width, observed during all test series with temperatures above 1832 degrees Fahrenheit in satisfactory fashion. At lower temperatures, however, the spreading is considerably greater than the equation indicates. Inasmuch as the resistance to flow, which opposes the relative movement of material in the longitudinal direction, is regarded as the cause of spreading, this phenomenon also points toward an increase of friction between rolls and bar with falling temperature.

However, a doubt may remain as to whether the forgoing formula for the calculation of spreading can be used if the width of the bar differs greatly from that of the bars rolled in these tests. In order to overcome this objection, spreading tests have been evaluated which were carried out under various conditions by A. Falk[54]. The thickness of the bars varied in these tests from 0.13-inch to 2.40 inches, the width from 0.23-inch to 7.87 inches, and the rolls used varied from 9.05 to 16.9 inches diameter. The observed values of spreading are shown in Fig. 59, in the same manner as in Figs. 53 to 58, against the product of contact length by relative reduction in thickness, as abscissas. Excluding the values for steel strips rolled in grooves, in which the walls of the pass restrict spreading, and excluding edging passes, which produce somewhat smaller spreading, it is observed that all values with few exceptions lie within the region enclosed by the two indicated lines for which C = 0.3 and C = 0.4, respectively. The line

$$\triangle b = 0.35 \times l_d \times \frac{\triangle h}{h_o}$$

corresponds closely to the average of all test values.

Comparison of this formula for spreading with the commonly used spreading formula proposed by Geuze[55]:

$$\triangle b = 0.35(h_o - h_1) = 0.35 \times \triangle h.$$

discloses the two formulae are identical when the quotient of the contact length and the thickness of the bar is 1. This is the case usually approached in ordinary billet rolling,

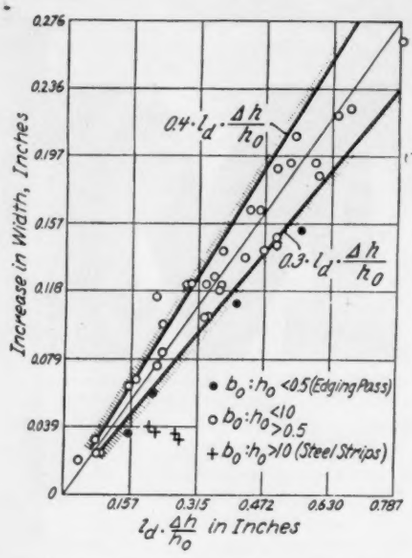
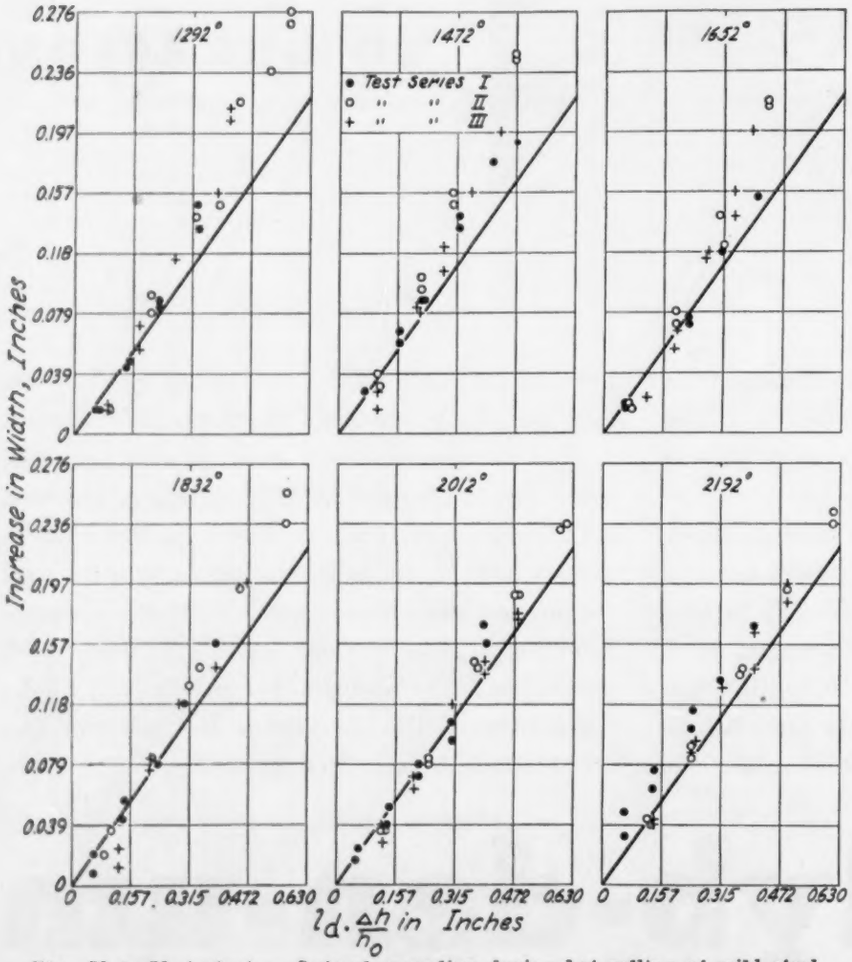


Fig. 59—Evaluation of spreading tests made by A. Falk



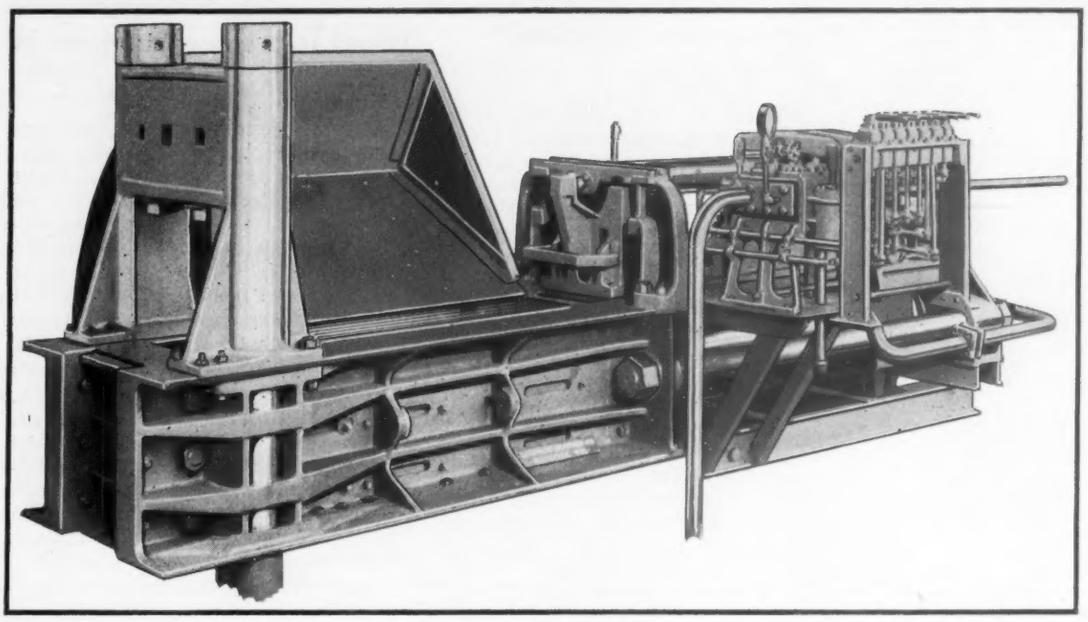
Figs. 53 to 58, inclusive—Lateral spreading during hot rolling of mild steel

[54] A. Falk: Die Breitung des Eisens in Glattwalzen; St. u. E. 30(1910) p.1986/93.

[55] L. Geuze: Memoires sur l'ecoulement des corps solides; second edition, Ch. Beranger, Paris 1921.

POWER-*SPEED*-ENDURANCE

Logemann Mill Type Scrap Press



HERE'S a press that can take it—Here's a press that can step—Here's a press specifically made for rough, tough hard service mill installations.

Fast working ove size rams produce exceedingly dense bales. Pumps are especially designed for high speed work—geared for tonnage. Hoppers are supplied for convenient, rapid filling. Cover, valve and hopper too, are all air operated. Bale ejection is automatic. Speed can be governed to meet local loading conditions. Sheet steel up to 100 inch lengths is expediently handled and baler speeds up to 100 and 120 bundles an hour can be maintained.

Such a press is this 1933 rugged mill unit—designed and built to meet today's demands for low cost superservice equipment.

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and for this condition the formula developed by Geuze also provides reasonable values of spreading. In the rolling of blooms, however, or in strip mills, the spreading values calculated from Geuze' formula must be wholly worthless. In the former case, because of the small diameter of roll in comparison to the thickness of the bar, the quotient mentioned is always only a fraction of 1, and the spreading is correspondingly much smaller than is to be expected from Geuze' formula: in the latter case, the relations are precisely reversed, and the formula proposed by Geuze accordingly yields too small values.

Frictional Relations Vary

The fact must nevertheless be kept in mind that the derived spreading formula generally cannot be valid, because it does not consider the influence of surface friction. With each metal the frictional relations are different and particularly, the frictional relations in cold rolling are fundamentally different from those in hot rolling.

Extensive tests of the spreading phenomena in the cold rolling of various metals have been made by E. Siebel and E. Osenberg[85a], as well as by W. Lueg and E. Osenberg[85a], in which the influence of surface friction especially was studied in detail. Also of interest in this connection are rolling tests which were conducted by A. Pomp and W. Lueg[85b] with steel strips 2.36 inches wide at temperatures from 68 to 1292 degrees Fahrenheit. These tests revealed that the spreading, as well as the forward slip of the material, increased with rising temperature. At 572 to 1292 degrees Fahrenheit the spreading and forward slip amounted to many times their values at room temperature. Inasmuch as the friction between rolls and material increases in a similar manner with rising temperature, because of the elimination of all lubricating influences and because of the oxidation of the surface of the material, these tests confirm the close relation between surface friction and the flow of material.

(To be Continued)

How Steel Aids Harnessing Of Colorado River

(Concluded from Page 24)

and one at each tunnel adit near the river level.

In addition to the so-called "government" cableway, there are eight auxiliary cableways installed for handling construction materials, tractors and other machinery.

Handling-equipment of special design will be used to transport the gigantic pipe sections from the landing ledges into the channels and to their final positions, the first sections erected in each tunnel being set vertically under the inlet towers.

Compensate for Climate

In addition to the problems incident to the fabrication, handling, and installation of sections of pipe of a size comparable with that of the average three-story dwelling, the climate itself introduces a problem which is of considerable importance. During the summer, the temperature in this region ranges from 95 degrees Fahr. at night to as high as 120 degrees during the day. Consequently, the temperatures of the pipes will be considerably higher during most of the erection period than they will be when water is turned into them.

It is, of course, out of the question to provide expansion joints to absorb the movement due to expansion and contraction either during the erection period or afterward. Accordingly, the pipes will be secured to massive steel-and-concrete anchors, placed about 400 feet apart; and during erection, one circumferential pipe-joint midway between each pair of anchors will be left open temporarily, and the final connections made after the pipe has been cooled to the approximate temperature of the water It may be possible to make these connections during the winter, when the temperature drops to as low as 20 degrees outside the tunnels, and when the air in the tunnels may be sufficiently cold for the purpose, but if this is not feasible, artificial cooling will be employed.

Engineers Probe Economics Of Milling vs. Planing

(Concluded from Page 25)

pounds for wrought and 45 for cast, but many impact figures were nearly as high as those for the materials before creep test.

Carbide precipitation occurred at elevated temperatures in both high and low carbon material, and was no more marked in the high than in the low. Though internal changes occurred, the creep curves showed no irregularities to indicate coincident alteration in creep resistance. Creep curves for all four lots kept changing in slope during the earlier part of the creep tests, a fairly constant rate of creep not being approached till more than 500 hours, as a rough average, had elapsed.

Many of the accelerated methods that have been suggested for determination of creep properties thus appear inapplicable to steels of this type. A few runs on wrought air-quenched bars indicated decidedly poorer creep resistance than on wrought water - quenched bars. Changes in magnetic permeability were determined on the bars after creep test, but no correlation was found between these changes and the creep or impact properties.

Meet To Review Progress in Current Foundry Practice

Recent progress in the development and application of gray iron, steel and malleable iron castings will feature a joint district meeting of the American Foundrymen's association, the Cleveland Engineering society and the Cleveland section of the American Society of Mechanical Engineers, at the Statler hotel, Cleveland, Wednesday evening, Jan. 31. The program will include an address on steel castings by Maj. R. A. Bull, consultant on steel castings. Chicago, as well as comments by other well-known foundry metallurgists.

Dan. M. Avey, editor, *The Foundry*, Cleveland, and vice president, American Foundrymen's association, will preside.

Research To Be Instituted on Metallurgy of Watchmaking

The metallurgy of watchmaking has been established as a research project at Battelle Memorial institute, Columbus, O., by the Elgin National Watch Co., Elgin, Ill., according to announcement by Dr. H. W. Gillett, director of the institute. Numerous alloys are used in watch parts, but the alloys so used have remained the same for many years, it is said. Metallurgical advances that other industries have developed and applied to their products have been lacking in the horological industry. Improvement and standardization of the metal in watch parts are the primary aims of this new project.

Data Compiled on Framing Members for Steel Houses

Advance data sheets for architects, contractors and builders, dealing with the use of Stran-Steel members for framing in houses, apartments, cottages, shops, partitions and the like, have been issued in the form of a 20-page booklet by the Stran-Steel Corp., Detroit. A feature of these sections is that they permit nailing building materials to them. A steel house with this type of framing was on exhibition during the Century of Progress exhibition in Chicago this year; features of this house, as well as the steel framing, were described in STEEL for April 3, p. 22.

[85a] W. Lueg and E. Osenberg: Der Einfluss der Reibung beim Walzen von Bandstahl; Mitt. K. W. Inst. fuer Eisenforsch. 15(1933)p.99.

[85b] A. Pomp and W. Lueg: Walzversuche an kohlenstoff- und siliziumlegierten Stahlen bei mittleren Temperaturen; Mitt. K. W. Inst. fuer Eisenforsch. 15(1933)p.81.

New Books Worth Reading

SCIENCE ◆ ECONOMICS ◆ BUSINESS

Stainless Steels Codified; Experts Tell Their Virtues

The Book of Stainless Steels, by Ernest E. Thum; cloth, 631 pages, 6 x 9 inches; published by American Society for Steel Treating; supplied by STEEL, Cleveland, for $5, plus 15 cents for postage; in Europe by Penton Publishing Co. Ltd., Caxton House, Westminster, London.

Some 77 authorities have collaborated in production of this book, all engaged in making and using the many kinds of heat and corrosion-resisting chromium alloys. Each has written a chapter on his specialty. As a whole the volume represents pioneer work in describing American usage and practice.

Arrangement of the subject matter forms a logical and consecutive compendium of practical information, with emphasis on the use of various types of stainless steel. About two-thirds of the chapters describe properties of the metals, how to fabricate and what to expect of them. Others tell of a multitude of successful applications.

The widening field of use for stainless steel indicates this book will be of value in many industries, from the manufacture of artificial silks to building of heavy machinery. The reader need not be a highly-trained metallurgist to profit from it and the technical man will find plenty of precise information.

◆

Steel Plants, Officers, in New Industrial Directory

Directory of Iron and Steel Plants, 1934, fabrikoid, 140 pages, 5 x 7½ inches; published by Steel Publications Inc.; supplied by STEEL, Cleveland, for $10, plus 15 cents for postage; in Europe by Penton Publishing Co. Ltd., Caxton House, Westminster, London.

The preceding issue of this invaluable directory was in 1932 and the great changes that have taken place in the interval outmodes information then accurate, making the new issue necessary to those keeping contact with the steel industry.

It lists companies and officials operating blast furnaces, steel plants, rolling mills and by-product coking plants in the United States and Canada.

Presentation of the information is designed to expedite finding by name and by locality. At the end of the blast furnace and steel plant section and again at the end of the coke and allied industries section a geographical index lists all plants under states and cities. Detail of the companies and their personnel is presented in the alphabetical section, the geographical list containing only the name of the company.

◆

Engineering For Profit— A Study of Profitgraph

Profit Engineering, by C. E. Knoeppel, cloth, 326 pages, 6 x 9½ inches; published by the McGraw-Hill Book Co. Inc. and supplied by STEEL, Cleveland, for $3, plus 15 cents postage; in Europe by Penton Publishing Co. Ltd., Caxton House, Westminster, London.

While the idea of the graphic budgeted variable income statement or profitgraph, is more or less familiar to the iron and steel industry, through publication of a similar chart applied particularly to foundry practice in the July 1 and July 15, 1931, issues of *The Foundry*, the applied economics in making business profitable, as presented in this volume, should be of extraordinary interest to those in charge of any type of industrial concern.

The book outlines the plan of business organization and methods of operation, such as to assure a profit as far as is humanly possible under good management. Its purpose is to stimulate constructive thinking on the part of the reader by the graphic presentation of principal ideas relating to the fundamental factors and principles of business organization, management and control.

◆

Unemployment and Machines; Society Can Modify Effects

Common Sense About Machines and Unemployment, by Morris P. Taylor; cloth, 173 pages, 5¼ x 8 inches; published by John C. Winston Co., Philadelphia, and supplied by STEEL, Cleveland, for $1.50, plus 15 cents postage; in Europe by Penton Publishing Co. Ltd., Caxton House, Westminster, London.

This book is an endeavor to analyze problems resulting from mechanization, to determine why society has failed to use machinery properly and to consider the control necessary to make machinery further the progress of civilization.

The author believes that unemployment is due not only to the decline in trade, but also to the displacement of workers by machinery. Mechanization has reduced employment directly and trade indirectly. These are not necessarily the effects of the use of machinery, but occur because production and consumption are out of balance. The author points out that if production and consumption were kept adjusted, machinery would improve the average standard of living and advance material civilization.

However, it is pointed out that it is not necessary to abandon our social and economic structure and start on an entirely new basis. To accomplish the necessary reforms, a series of reasoned and moderate changes, designed to combine the equities of the present with the well-being of the future, has more promise than a complete and immediate change in the present economy. Nevertheless, the author predicts that the future developments will be away from the traditional *laissez-faire* capitalism, with the competitive system considerably modified.

◆

Metal Standards Presented In Triennial Publication

A. S. T. M. Standards, 1933, published by the American Society for Testing Materials; cloth, two volumes, 2300 pages, 6 x 9 inches; supplied by STEEL, Cleveland, for $7.50 each part, both for $14, plus 15 cents for postage; in Europe by Penton Publishing Co. Ltd., Caxton House, Westminster, London.

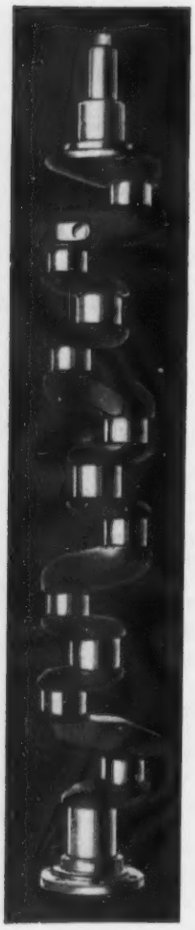
This is a triennial publication containing all the standard specifications, methods of test, recommended practices and definitions formally adopted by the society. Part I is devoted to metals and Part II to nonmetallic materials.

In Part I are given 185 standards, of which 104 cover the ferrous metals, steel, wrought iron, pig iron, iron castings and ferroalloys; 70 relate to nonferrous metals, including aluminum and magnesium alloys, copper and copper alloys, lead, nickel, zinc, bearing metals, solder metal, deoxidizers, electrical-heating and electrical resistance alloys. Eleven of the standards involve metallography and general testing methods.

Part II contains 285 standards, covering specifications and test methods for cement, lime, gypsum, refractories, coal and coke, electrical insulating materials and numerous others.

NORMALLOY

an intermediate alloy forging steel for MEDIUM STRESSED PARTS



For medium stressed automotive parts—crankshafts, connecting rods, steering rods, axle shafts and other applications—there has been a need for a general purpose forging steel . . . a steel which combines the tensile and dynamic properties of an alloy steel with the forgeability, machineability and other advantages of less expensive carbon steels. Such a steel is Normalloy, developed to meet just these requirements.

Normalloy is a general purpose forging steel of Manganese-Chromium-Vanadium composition. While these alloys are used individually in only moderate amounts the total is sufficient to insure ample tensile and dynamic properties. The Vanadium content assures refinement of grain structure, restrains grain growth, increases diffusion rate, raises the elastic ratio, and insures uniform properties and behavior in mass production.

Normalloy is ideal for parts to be normalized only, and being a truly "normal steel" it is free from the harmful effects of "abnormality" on quenching and tempering. Throughout the various carbon ranges, Normalloy is a true water-quenching steel. With its Vanadium content and well-balanced composition Normalloy, with a simple normalizing treatment, develops physical properties equal to or exceeding those of quenched and tempered steels of the S.A.E. 1040 type.

Many thousands of automobile crankshafts have been made of Normalloy, with the elimination of warpage, straightening operations, and other difficulties incident to quenching.

We have a great deal of interesting data on this new general purpose forging steel—its various composition ranges, physical properties, uniformity and other advantages. We shall be glad to send you this information or to answer any questions about Normalloy.

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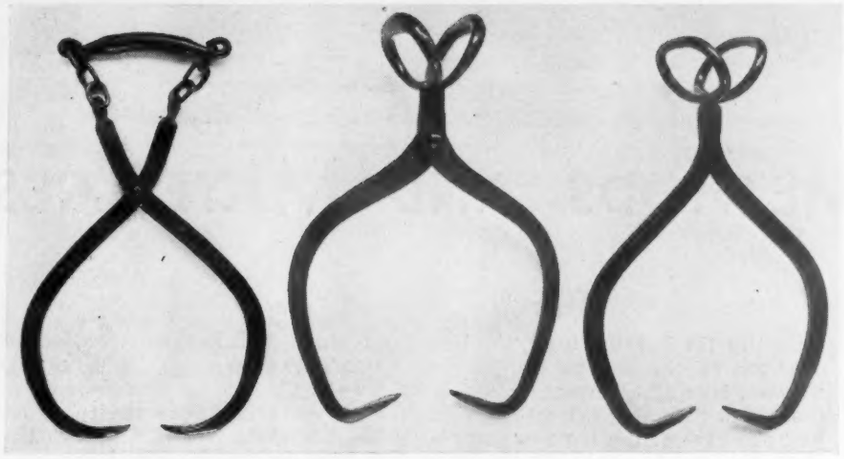
Of vanadium, silicon, chromium, titanium and silico-manganese, produced by the Vanadium Corporation of America, are used by steel makers in the production of high-quality steels.

NORMALLOY

an intermediate alloy forging steel for MEDIUM STRESSED PARTS



Three types of ice tongs, the one in the center being forged from a steel bar, the other two being formed from steel strip. Manufacture of these implements accounts for an estimated 150 tons of steel annually

LARGE USES OF STEEL IN SMALL WAYS

253rd Article ◆ Ice Tongs

ONE of the oldest and commonest types of tools to be manufactured of steel, ice tongs have suffered little loss in use recently by the widespread adoption of the electric refrigerator. Users of the original type of ice box as well as of the mechanical unit have increased in number with the growth of population and with education in the importance of food preservation, while many farms where electricity is not available still employ ice houses and ice tongs. Although exact figures are not available, it is estimated roughly that manufacture of ice tongs requires annually about 150 tons of steel, principally bars and strip.

Vary from 2½ to 6 pounds

The design of ice tongs has varied but slightly during recent years, the accompanying illustration showing three types commonly used products of the Vaughan & Bushnell Mfg. Co., Chicago. These tongs vary in weight from 2½ to nearly 6 pounds, depending on the size, with a span ranging from 15 to 24 inches. The largest tong, shown in the center, is forged from low-carbon steel bars, while the other two are formed from strips.

In making the heavier type a ¼ x ⅞-inch bar is cut to the desired length and the solid handle is forged in a drop hammer. After the handle is punched and trimmed to remove the flashings, the duck bill or prong is formed in a bulldozer and the bar is curved to the proper contour. Two such pieces then are punched cold and riveted together. Heat treatment of the duck bills or use of high-carbon or alloy steel is not common practice since the points are subjected to but little wear by the ice.

Lighter tongs are adapted to use where only a small span is needed. These commonly are made of strip steel, the duck bills and handle ends being hammer-drawn. The handles may be of the conventional type or the chain style as illustrated, the latter preventing binding of the hand when the prongs are closed. Instead of being forged with a solid handle as in the case of the heavier units, however, the end section is bent to shape, either securing the chain handle as in the one type or else comprising the handle itself.

350 Inspect New Grinding Machines

OVER 350 visitors, representing industries in the United States, Russia, and Japan, attended the exhibition and demonstration of grinding machines held by the Norton Co., Worcester, Mass., during the week of Dec. 4. The exhibition was one of the most comprehensive ever attempted by the company, with approximately 7500 square feet of floor space devoted to the various machines in operation.

Eight of the machines shown were new and the remainder, while not newly created, were new in design. New grinding machines exhibited included type C semiautomatic, type D 10-inch, 6 x 18-inch hydraulic surface grinder, hydraulic crank pin grinder, cam grinding machine, tool and cutter grinder, conjugate grinder, and a 20-inch machine with a hydroformer.

Discussing the exhibit, Frank W. Smith, sales manager of the Norton machine division, said, "We have spent the past three years developing and perfecting this new line of machines. Now we are ready to put them on the market. I believe that many manufacturing concerns here and abroad are in need of re-equipping. I believe there will be a marked improvement in business in the near future, and we are ready to supply the demands."

On the opening day of the exhibition, visitors were greeted by Aldus C. Higgins, president of the Norton Co.; Charles L. Allen, chairman of the board; and George N. Jeppson, vice president and treasurer. The remainder of the week was devoted to inspection of the various machines and informal inspection of the Norton plant.

Rigidity of Two Types of Structural Joints Tested

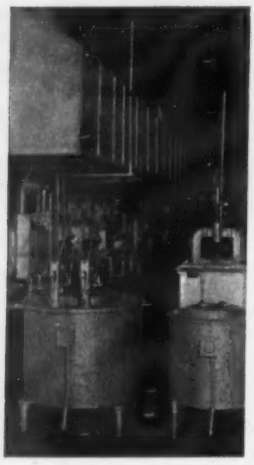
Report on alternate compression and tension tests made by the testing laboratory of Columbia university, New York, on the relative rigidity of structural steel butt joints assembled with hot-driven rivets, and with rivet-bolts manufactured by the Dardelet Threadlock Corp., 120 Broadway, New York, is available without charge from this corporation. The report includes six pages, two illustrations and three charts. Tests are reported to have been made in response to requests from structural engineers on the Pacific Coast, and the results are claimed of particular value to engineers designing structures which are liable to be subjected to earthquake shock.

Survey Use of Nickel Alloys

Information on castings of monel metal, nickel and high-nickel alloys is contained in a 30-page lavishly illustrated booklet recently published by the International Nickel Co. Inc., 67 Wall Street, New York. Typical applications are classified into three groups—mechanical, chemical and appearance. Average compositions and properties of the materials are tabulated.

Making the Most of

METHODS AND MATERIALS



THROUGH utilization of carbon dioxide, a western welding company repaired a leak in a gasoline truck without first steaming the interior of the tank to clear it of explosive hydrocarbon gases. The job consumed 15 minutes and left the surface of the tank with only slight defacement, easily remedied by a few strokes of a paint brush. Elimination of explosion hazards in this kind of welding job results from the fact that carbon dioxide, which is made in both solid and liquid form, becomes inert gas with a specific gravity of about 1.52 as it vaporizes. Therefore, it is heavier than hydrocarbon gases or air. If mixed with hydrocarbon gases in the proportion of 1 part carbon dioxide to 4 of the gases, the mixture is nonexplosive. As a precautionary measure, it is usual to make a 40 per cent mixture. An analyzer is used to ascertain the percentage of carbon dioxide gas and hydrocarbon gases just as in making a test for presence of oxygen in a gas.

$ $ $

One foundry making lathe beds had been using 0.25 per cent chromium in its cast iron. It added 0.50 per cent molybdenum to this iron, and despite a substantial increase in physical properties and a small increase in hardness, it raised the roughing machining speed from 20 to 40 feet per minute without any distortion.

$ $ $

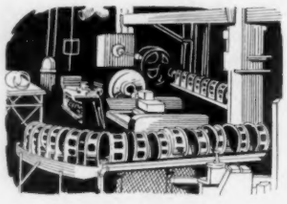
LACQUERS generally are sprayed, though many small products and some large ones are dipped—this being an appreciably more economical method. In many cases, a slight change in design will permit dipping an article which otherwise would require spraying. One company was having considerable difficulty in obtaining a smooth finish on stamped steel parts by dipping, as an ugly run occurred where the sides were attached to the body by lugs. The lacquer ran off the lugs after the body was set, leaving an irregular sag in the finish. Changing the assembly so that the edge of the lug ran perpendicular to the base instead of parallel practically eliminated the trouble. Objects with rounded edges dip much better than those with sharp ones—often the edges could just as easily be rounded, thus permitting more economical handling.

$ $ $

The cement industry has found a place for high-chromium steels in form of liners, pug mill blades, tubes, hangers and saddles, in some of which uses the steel must withstand abrasion as well as oxidation at high temperatures. High-carbon, high-chromium steels have resisted for long periods the severe abrasion and oxidation to which rolling mill guides are subjected continually.

$ $ $

Characteristics of deposited weld metal are of interest to electrical machinery designers contemplating the fabrication of magnetic circuits. While it is possible usually to arrange the magnetic circuit so that very little magnetic flux must pass through the welded joint, nevertheless it is of interest to know what sort of magnetic circuit the weld will make in event it is necessary to make use of it. According to a recent research, the four factors tending toward best magnetic properties are: 1. Use of atomic hydrogen equipment; 2. annealing at 1000 degrees Cent. in hydrogen for 2 or 3 hours; 3. hydrogenizing; and 4. use of a special iron-silicon electrode containing about 2 per cent silicon.



$ $ $

For small emergency jobs, compressed air in cylinders can be used for driving rivets. In a midwestern city, this method was used to replace 64 rivets in a railroad electrification standard damaged by a derailment. Two cylinders of compressed air equipped with proper regulators and two 10-foot lengths of 5/16-inch hose maintained the 90-pound reservoir pressure necessary to operate the hammer. A check of air consumption showed that 220 cubic feet drove 20 rivets of ⅞-inch diameter, which, it is said, was about the same consumption required when using air from the usual source. Cylinder air also was used to ream the rivet holes, using a 4-cylinder air motor. It was found that eight holes could be reamed per 100 cubic feet of air, and in less time than the crew could ream one hole by hand.

$ $ $

CALORIZED carbon-molybdenum steels combine the properties of high creep strength with excellent corrosion resistance. Mild-carbon 0.50 per cent molybdenum steel calorized has a creep strength of 1650 pounds at 1200 degrees Fahr.; a steel containing 1.00 per cent molybdenum has a strength of 2600 pounds under the same conditions. This comparison indicates the promising future of a high creep strength steel which has more than the usual 0.50 per cent molybdenum. The very large increment in strength at 1200 degrees of the 1.00 molybdenum over the 0.50 per cent molybdenum is expected to lead to the use of higher contents of this element in the 4-6 per cent chromium steel.

$ $ $

In welding chrome-molybdenum aircraft members and fittings, a soft neutral flame must always be used. An oxidizing flame will tend to burn the metal and weaken it so that it will crack as it contracts in cooling. An excess acetylene flame tends to carburize the metal and make it brittle. Where jigs are used, they should allow for the contraction which takes place as the weld and surrounding metal cools. If the parts are free to move, no stress occurs, but if the jig holds them rigid, the force contracting the piece will cause a break at the weakest point, which is where the metal is white hot. Drafts of air must be kept away from parts being welded. Drafts chill the metal and make it contract more quickly, straining the white hot parts.

OXWELD NO. 1 H.T. PATENTED

OXWELD NO. 25 M. BRONZE PATENTED

what's in a Name?

Use the **FULL NAME** *When Specifying Welding Rod—It Pays*

Just because two welding rods made by different manufacturers happen to bear the same number does not necessarily mean that they are alike. The chances are a million to one that they are not. Be sure you get exactly what you want. Order your welding rods by the full name. For example, if you want Oxweld No. 25 M. Bronze Welding Rod, a rod nationally known for its high tensile strength and for its free-flowing and non-fuming properties, don't just ask for "No. 25 Rod." Call it by its full name "Oxweld No. 25 M. Bronze Welding Rod" and be assured of the highest quality. Any rod can be called "No. 25",—whether it is for aluminum, bronze or steel—but there is only one genuine "Oxweld No. 25 M. Bronze Welding Rod."

Send for this Welding Rod Book

● An attractive book giving the full name of each Oxweld welding rod together with a complete description of its properties, characteristics and uses may be had for the asking at any Linde District Office. This book is written in clear, non-technical language, and contains a fund of reliable welding rod information. It is a book you'll want to keep for reference. Get your copy today.

THE LINDE AIR PRODUCTS COMPANY

Unit of Union Carbide and Carbon Corporation

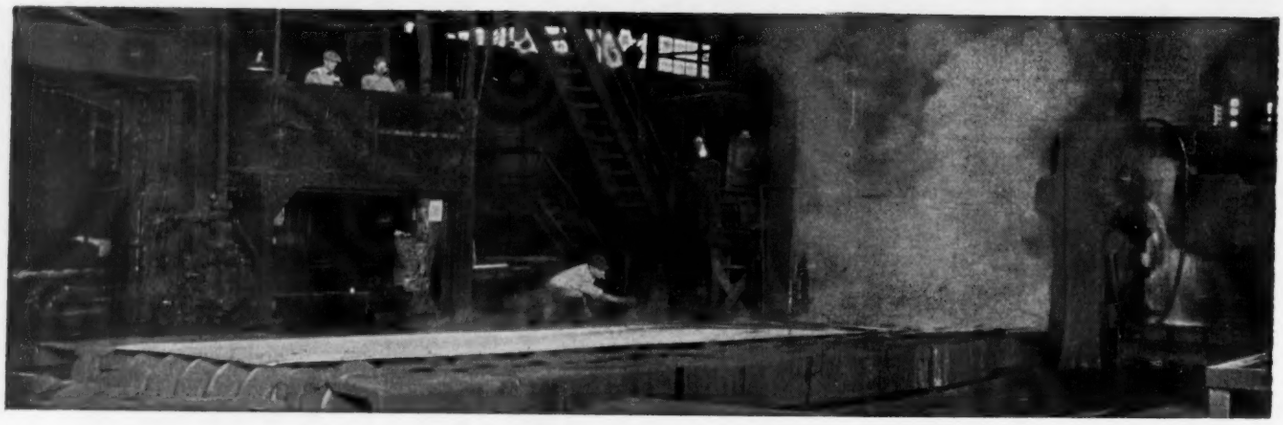
126 Producing Plants UCC 627 Warehouse Stocks

IN CANADA, DOMINION OXYGEN COMPANY, LTD., TORONTO

District Offices

Atlanta	Cleveland	Kansas City	Pittsburgh
Baltimore	Denver	Los Angeles	St. Louis
Birmingham	Detroit	Milwaukee	Salt Lake City
Boston	El Paso	Minneapolis	San Francisco
Buffalo	Houston	New York	Seattle
Chicago	Indianapolis	Philadelphia	Tulsa

NRA MEMBER U.S.

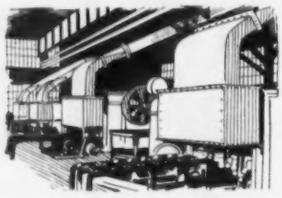


PROGRESS IN STEELMAKING

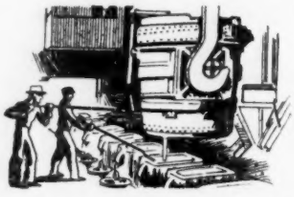
TENSILE strength of sheet, strip, wire and cable can be determined on a recently developed power-driven testing machine which operates on the pendulum principle with automatically-controlled operation. When the specimen breaks, the tensile strength is indicated on a dial. The motor and pulling clamp stop automatically and the pendulum returns to its starting position.

♦ ♦ ♦

Inspecting cold-drawn bars for surface defects and internal seams and cracks now is being accomplished magnetically at an Ohio plant. The detected imperfections are indicated by a curve produced by a beam of light shown on a ground glass. The work is free from imperfections as long as the curve remains of a certain amplitude and shape; any waver in the light curve, however, indicates defective stock. Bars up to 3 inches diameter can be inspected with the unit at the rate of 70 feet a minute. In addition, the apparatus can be employed for identifying grades of steel which have become mixed or steel with a marked variation in analysis. Should bars made from different heats of steel become mixed either in handling or in transit, the magnetic testing unit will assure the proper separation.



SHEET and pair furnaces serving mechanical equipped hot mills now can be equipped with an electric proportioning system which affords the attendant either automatic or remote control of the fuel valve opening so that the pressure will be varied to conform to the atmosphere he desires. The system also may be employed to regulate automatically the flow of gaseous or liquid fuel and air to maintain the rate of combustion required to maintain a uniform temperature.



SATISFACTORY rimming action is obtained in pouring open-hearth rimming steel when the iron oxide content of the slag is between 17 and 21 per cent, according to a recent investigation. This range is maintained in 0.07 to 0.10 per cent carbon heats by holding the lime-silica ratio of the slag about 3 to 3.3 per cent which necessitates a lime charge of 9.5 per cent.

♦ ♦ ♦

Low water consumption is claimed for a spray recently adapted to the descaling of plates and other steel commodities in the process of reduction. The water in a round stream strikes a curved deflector plate with retaining sides which results in a flat spray, free from mist, being directed on the surface of the material being cleaned.

♦ ♦ ♦

Thermal, mechanical and microscopical investigation by English metallurgists of mild steels containing from 0.05 to 0.63 per cent tin discloses that the presence of tin up to the maximum content does not injure the resistance of the steel to tensile stress in any way. The minimum amount, however, lowers the shock-resisting properties of this grade steel and when the content of tin exceeds 0.2 per cent the effect is serious. The effect is more detrimental if the metal is subjected to a low-temperature temper, or if it is subjected to slow cooling through the range of 752 to 392 degrees Fahr. after tempering. The detrimental effect of tin on impact strength of mild steels is minimized by resorting to a quench after a full temper at about 1150 degrees Fahr.

♦ ♦ ♦

Photoelectric cells now are used in oil-fired furnaces and boilers as a precautionary measure against explosions. The cell is mounted in a pipe leading directly into the firebox. Should the flame fail, the cell opens its sensitive relay. The starter coil is de-energized, causing the blower motor to shut down and an electrically-operated valve to close. The flow of oil to the burners is arrested, thus preventing the fuel from accumulating in the boiler or furnace and obviating the likelihood of an explosion.

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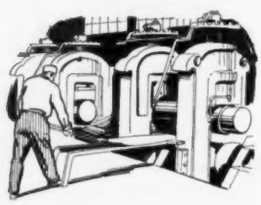
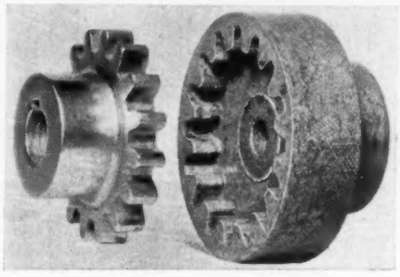
Normalizing welded steel tubing in an electric furnace with a controlled atmosphere leaves the tubing with a bright surface and free from scale. The pickling operation thus is obviated and a saving ranging from $1.60 to $1.70 a ton effected.



CONTROLLED centralized system of lubrication for hot sheet and tin mill roll neck bearings has effected savings in lubricating costs ranging from 2 to 15 cents per ton of steel rolled.

Molded Synthetic Material Features Coupling

Continental-Diamond Fibre Co., Newark, Del., recently developed a sprocket coupling, shown herewith. The female end of the new unit is molded of macerated Celoron, a synthetic material used widely in the construction of silent gears and valve disks. Light weight is an important feature. It also is a safe coupling;



Celoron sprocket coupling made by Continental-Diamond Fibre Co.

the metal sprocket is completely enclosed in the celoron half of the unit. Consequently there are no projections. Because the material is a good electrical insulator, a motor equipped with the female or celoron half of the coupling is completely insulated from the unit which it drives. Seven standard types, each one designed to cover a wide range of horsepowers, are available.

♦ ♦ ♦

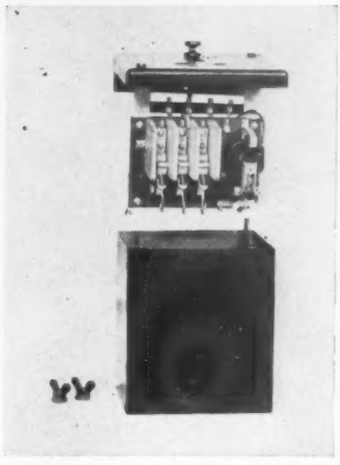
Builds Unit to Dehydrate Oil Emulsions

National Radiator Corp., Johnstown, Pa., is marketing a new type of heater for breaking emulsions of water in crude oil. The unit has a number of noteworthy features such as readily increasable capacity, adaptability to various methods of treating emulsions, efficient heat transfer and simplicity of construction. Oil temperatures are thermostatically controlled.

♦ ♦ ♦

Magnetic Switch Is Oil Immersed Type Unit

General Electric Co., Schenectady, N. Y., is marketing oil-immersed magnetic switches for use in corrosive atmospheres where class 1, group D control is not required. This switch, shown herewith, and designated as GR7006, is designed for controlling motors which can be started on full voltages. The equipment consists of a standard magnetic switch with special coils and special contact tips for operation under oil. The magnetic switch and a special oil immersed temperature overload relay are fastened to the cover and extend into the oil. Relay can be reset by means of a button projecting through the top cover.



GE oil-immersed switch for corrosive atmospheres

♦ ♦ ♦

Manufactures New Line of Single-Phase Motors

Marble-Card Electric Co., Gladstone, Mich., recently developed a line of single-phase motors, known as capacitor type. They are similar in construction to a two-phase squirrel cage motor with a condenser connected across one phase for starting, it being cut out of the circuit by a simple contactor when the motor comes up to speed. Condenser and contactor are mounted in a metal box as shown in the accompanying illustration.

New Marble-Card single-phase motor

♦ ♦ ♦

Contour Grinder Employs Vertical Spindle

Baker Bros. Inc., Toledo, O., recently added a new contour grinder to its line of special production machines. The grinder which is shown in the accompanying illustration is arranged with a vertical spindle mounted on large precision antifriction bearings. Three changes of speed are provided from the v-belt drive so that different wheel diameters may be used. One of the main features of the contour grinder according to the manufacturer is the up and down reciprocating action of the entire spindle assembly.

Vertical spindle contour grinder developed by Baker Bros. Inc.

The spindle end is arranged with a quick action chuck adapted to various types of solid and cup wheels, and polishing drums. The table is 18 inches in diameter, and is ribbed to allow close alignment between table and spindle. It is mounted on a slide with provision for raising and lowering. The table also is arranged so that it may be set at various angles for angular grinding.

"Gee, I wish Daddy wasn't hurt!"

"Daddy" is just one of the many thousands whose incomes are suspended due to lost-time accidents. The National Safety Council estimates the annual wage loss chargeable to industrial accidents at $370,000,000. Approximately one-sixth of these accidents are caused by falls, many of which could be prevented by proper floor protection. CARNEGIE FLOOR PLATE provides an excellent safeguard for industrial flooring, stair treads, elevated platforms and many other places where a safe foothold is necessary. CARNEGIE FLOOR PLATE is an investment where returns are figured in terms of human life and happiness as well as in dollars.

CARNEGIE STEEL COMPANY • PITTSBURGH

Subsidiary of United States Steel Corporation

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Structural, Railroad Demands Mount; Rate Up

Trend in Operations Continues Strong—Shape Awards Second Largest of Year —Cars Develop 300,000 Tons—New Price Policy To Induce Earlier Buying

STEEL market activity was quickened last week by a strong combination of the second largest weekly awards in 1933 for structural material, negotiations for upward of 13,000 freight cars with other railroad programs maturing, a further flurry in scrap prices, and the expiration Jan. 1 of all contracts carrying prices lower than those announced for first quarter.

The result—wholly contrary to the seasonal trend—was a 4-point rise in steelworks operations to 33 per cent, highest in eight weeks, and a sudden expansion in shipments by some producers to a level exceeding even those of last July. The drive for specifications may well engage iron and steelworks at or near the present rate over the holiday period.

Since comparatively few first quarter contracts have been concluded, mills may be confronted with lean order books Jan. 1, and some apprehension is expressed concerning the production situation in the early weeks of January.

The probability, however, is that automobile manufacturers will begin specifying vigorously for material for new models, while a new policy with regard to quoting is calculated to relieve stress at the close of the quarter, such as now evident, and to spread business more evenly.

This policy provides for the announcement of a quarter's prices at least two months before the beginning of the quarter. For example, it is expected by about Jan. 15 prices for the second quarter will be issued, and present indications point to a rise of $2 to $3 a ton on bars and strip, and $2 on semifinished steel, plates and shapes.

300,000 Tons Up for Cars; Pennsylvania Buys 50,000 Tons of Miscellaneous Steel

Nearly 300,000 tons of steel will be required for the 12,775 freight cars and 167 passenger and baggage cars for which federal financing has been concluded. Of these, the Erie's list of 3775 freight cars, 125 passenger and eight baggage cars already are up for figures.

This program by the Van Sweringen lines is believed to be only the beginning, and possibly the smallest, of impending car business. Included in the loan just announced by the public works administration is 30 locomotives.

Other developments in railroad material are purchases of 13,000 tons of tie plates by the Pennsylvania from the Republic Steel Corp. and 12,000 tons from Weirton Steel Co., and the Pennsylvania's division of 25,000 additional tons of miscellaneous steel to five other interests. Western Pacific is inquiring for 26,000 tons of rails and fastenings, Missouri Pacific for 25,000 tons, and Lehigh & New England for 500 freight cars. Boston & Maine and Central of Georgia have been allotted a $6,000,000 PWA loan, for equipment.

Except the week of May 6, when 126,000 tons of structural material was ordered for the San Francisco-Oakland bridge, awards for the past week, amounting to 35,170 tons, were the largest of the year. This tonnage was built up by 12,000 tons for 26 bridges in the New York Central's grade elimination project at Syracuse, N. Y.; 5000 tons for the Mathieson Alkali Co., Port Arthur, Tex., and 4000 tons for the San Francisco postoffice.

Protections for Fabricated Work Extended Beyond Jan. 1; Raw Material Active

Miscellaneous structural steel requirements, mainly for public work, are increasing. Fabricators have an advantage in the protections given them on prices for specific jobs, extending to the time those jobs are closed; with these exceptions, all other fourth quarter contracts expiring automatically Jan. 1.

The movement of pig iron is unusually brisk, some of the lake furnaces shipping nearly twice as much in December as last month. Orders for January delivery have improved, but few melters are contracting for the full first quarter. A Pittsburgh furnace is inquiring for six months' supply of coke, approximately 60,000 tons. Scrap prices are up sharply.

Steelworks operations last week were increased in all but two districts. Detroit was up 16 points to 52 per cent, Cleveland 5 to 59, Pittsburgh 4 to 28, Chicago 4 to 29½, eastern Pennsylvania 4½ to 23, Youngstown 1 to 36, and Buffalo 1½ to 25½. The Wheeling district remained unchanged at 41, and Birmingham at 52, while New England was down 10 points to 71 per cent. Any change in the rate this week is expected to be upward.

STEEL's iron and steel composite last week remained $32.42, and the finished steel composite, $51.10; while the scrap index was up 26 cents to $10.17.

COMPOSITE MARKET AVERAGES

	Dec. 16	Dec. 9	One Month Ago Nov., 1933	Three Months Ago Sept., 1933	One Year Ago Dec., 1932	Ten Years Ago Dec., 1923
Iron and Steel Composite	$32.42	$32.42	$31.59	$31.30	$28.93	$43.02
Finished Steel Composite	51.10	51.10	49.20	48.52	46.74	67.53
Steelworks Scrap Composite	10.17	9.91	9.64	10.83	6.41	16.00

Iron and Steel Composite:—Pig iron, billets, slabs, sheet bars, wire rods, tin plate, nails, sheets, plates, shapes, bars, and black pipe. Finished Steel Composite:—Plates, shapes, bars, hot strip, nails, tin plate, pipe. Steelworks Scrap Composite:—Heavy melting steel and compressed sheets.

A COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

	Dec. 16, 1933	Nov. 1933	Sept. 1933	Dec. 1932
Finished Material				
Steel bars, Pittsburgh	1.75	1.75	1.60	1.60
Steel bars, Chicago	1.80	1.80	1.70	1.70
Steel bars, Philadelphia	2.04	2.04	1.91	1.91
Iron bars, Chicago	1.60	1.60	1.60	1.65
Shapes, Pittsburgh	1.70	1.70	1.60	1.55
Shapes, Philadelphia	1.90	1.90½	1.81½	1.75
Shapes, Chicago	1.75	1.75	1.65	1.70
Tank plates, Pittsburgh	1.70	1.70	1.60	1.60
Tank plates, Philadelphia	1.88	1.88½	1.79½	1.79½
Tank plates, Chicago	1.75	1.75	1.65	1.70
Sheets, No. 10, hot rolled, Pitts.	1.75	1.75	1.70	1.70
Sheets, No. 24, hot ann., Pitts.	2.25	2.25	2.25	2.10
Sheets, No. 24, galvan., Pitts.	2.85	2.85	2.85	2.85
Sheets, No. 10, blue anneal., Gary	1.85	1.85	1.75	1.80
Sheets, No. 24, hot anneal., Gary	2.35	2.35	2.35	2.20
Sheets, No. 24, galvan., Gary	2.95	2.95	2.95	2.85
Plain wire, Pittsburgh	2.20	2.10	2.10	2.20
Wire nails, Pittsburgh	2.35	2.10	2.10	1.95
Tin plate, per base box, Pitts.	5.25	4.65	4.65	4.25
Semifinished Material				
Sheet bars, open-hearth, Youngs.	26.00	26.00	26.00	26.00
Sheet bars, open-hearth, Pitts.	26.00	26.00	26.00	26.00
Billets, open-hearth, Pittsburgh	26.00	26.00	26.00	26.00
Wire rods, Pittsburgh	36.00	35.00	35.00	37.00

	Dec. 16, 1933	Nov. 1933	Sept. 1933	Dec. 1932
Pig Iron				
Bessemer, del. Pittsburgh	19.26	19.26	19.26	15.76
Basic, valley	17.00	17.00	17.00	14.00
Basic, eastern, del. eastern Pa.	18.76	17.76	17.76	13.75
No. 2 foundry, del. Pittsburgh	18.76	18.76	18.76	15.76
No. 2 foundry, Chicago	17.50	17.50	17.50	15.50
Southern No. 2, Birmingham	13.50	13.50	13.50	11.00
No. 2X. Eastern, del. Phila.	19.63	18.63	18.63	14.26
Malleable, valley	17.50	17.50	17.50	14.50
Malleable, Chicago	17.50	17.50	17.50	15.50
Lake Superior charcoal, del. Chi.	23.54	23.54	23.54	23.04
Gray forge, del. Pittsburgh	18.38	18.38	18.26	15.63
Ferromanganese, del. Pittsburgh	87.24	87.24	87.24	73.24
Scrap				
Heavy melting steel, Pittsburgh	$12.50	11.65	13.00	8.70
Heavy melting steel, eastern Pa.	10.25	9.56	10.50	7.25
Heavy melting steel, Chicago	8.75	8.35	9.95	5.45
No. 1 wrought, eastern Pa.	11.00	10.15	11.00	7.25
No. 1 wrought, Chicago	8.70	8.10	9.25	5.05
Rails for rolling, Chicago	10.25	10.25	11.25	8.25
Coke				
Connellsville, furnace, ovens	3.75	3.75	2.50	1.75
Connellsville, foundry, ovens	4.25	4.25	3.15	2.50

Steel, Iron, Raw Material and Metals Prices

Prices conform to American Iron and Steel institute schedules. Asterisks denote price changes this week

Sheet Steel

HOT ROLLED No. 10
(24 to 48 inches wide)

Pittsburgh, base	1.75c
Gary, base	1.85c
Chicago, del.	1.88c
New York, del.	2.08c
Philadelphia, del.	2.04c
Birmingham, base	1.90c
St. Louis, del.	2.07c

HOT ROLLED ANN. No. 10

Pittsburgh, base	1.90c
Gary, base	2.00c
Chicago, del.	2.03c
Philadelphia, del.	2.19c
New York, del.	2.23c
St. Louis, del.	1.97c
Birmingham, base	2.05c
F.o.b. cars, dock Pacific ports	2.42½c

HOT ROLLED ANN. No. 24

Pittsburgh, base	2.25c
Gary, base	2.35c
Chicago, del.	2.38c
Detroit, del.	2.45c
New York, del.	2.58c
Philadelphia, del.	2.54c
Birmingham, base	2.40c
St. Louis, del.	2.57c
F.o.b. cars, dock, Pacific ports	2.95c

GALVANIZED No. 24

Pittsburgh, base	2.85c
Gary, base	2.95c
Chicago, del.	2.98c
Philadelphia, del.	3.14c
New York, del.	3.18c
Birmingham, base	3.00c
St. Louis, del.	3.17c
San Francisco, f.o.b. cars, dock	3.55c

TIN MILL BLACK No. 28

Pittsburgh, base	2.65c
Gary, base	2.75c
St. Louis, del.	2.97c

COLD ROLLED No. 10

Pittsburgh, base	2.30c
Detroit, delivered	2.50c
Gary, base	2.40c
Philadelphia, del.	2.59c
New York, del.	2.63c

COLD ROLLED No. 20

Pittsburgh, base	2.75c
Detroit, del.	2.95c
Gary, base	2.85c
Phildelphia, del.	3.04c
New York, del.	3.08c

ENAMELING SHEETS

Pittsburgh, No. 10	2.45c
Pittsburgh, No. 20	2.90c

Tin and Terne Plate

Per 100-lb. box, Pittsburgh. Gary base, 10 cents higher

Tin plate, coke base, contract	$5.25
* Do., stock	4.55
Long ternes, No. 24 unassorted	3.25c

Corrosion and Heat Resistant Alloys

Base, Pittsburgh

18% chrome, 8% nickel; sheets, 35c; plates, 31c; bars, 28c.

	A	B	C	D
Bars	17c	18.5c	21c	26c
Plates	20c	21.5c	24c	29c
Sheets	25c	28c	31c	35c
Hot strip	17c	18.5c	21c	26c
Cold Strip	22.5c	24c	27c	35c

Carbon 0.12 and under; no nickel. A has chrome 15% and under. B over 15/18% inc., C over 18/23% inc., D over 23/30%.

Steel Plates

Pittsburgh, base	1.70c
New York, del.	1.98c
Philadelphia, del.	1.88½c
Boston, del.	2.10c
Buffalo, del.	1.93½c
Chicago, base	1.75c
Cleveland, del.	1.88½c
Birmingham, base	1.85c
Coatesville, base	1.80c
Sparrows Pt., base	1.80c
Pacific Coast, f.o.b. cars, dock	2.25c
St. Louis, del.	1.97c

Structural Shapes

Pittsburgh, base	1.70c
Philadelphia, del.	1.90½c
New York, del.	1.95½c
Boston, del.	2.08½c
Bethlehem, base	1.80c
Chicago, base	1.75c
Cleveland, del.	1.88½c
Buffalo, base	1.80c
Birmingham, base	1.85c
Pacific Coast, f.o.b. cars, dock	2.25c

Bars

SOFT STEEL

Pittsburgh, base	1.75c
Chicago, base	1.80c
Birmingham, base	1.90c
Buffalo, base	1.85c
Cleveland, base	1.80c
Detroit, del.	1.90c
Pacific Coast ports, cars, dock, c.i.f.	2.30c
Philadelphia, del.	2.04c
Boston, del.	2.19c
New York, del.	2.08c
Pitts., forg. qual.	1.75c-2.25c

RAIL STEEL
To Manufacturing Trade

Pittsburgh	1.65c
Chicago	1.70c
Cleveland	1.70c
Gary, Ind.	1.70c
Buffalo	1.75c

IRON

Terre Haute, Ind., base	1.60c
Philadelphia, base	1.74c
Pittsburgh, refined	2.75c-7.50c

RE'INFORCING
New billet, cut lengths, carlots

Pittsburgh	1.90c
Chicago, Gary, Buffalo, Cleve., Birm., Young	1.95c
Gulf ports	2.30c
Pacific coast ports	2.45c
Philadelphia, del.	2.19c

Rail steel

Pittsburgh, base	1.75c
Chicago, Buffalo, Cleveland, Birm., Young.	1.80c
Gulf ports	2.15c
Pacific coast ports	2.30c

Wire Products □ □

(Prices on carloads. Mixed carloads up 10c; joint carloads up 20c; less carloads up 30c. 10% dis. on nail extras on straight or mixed carloads to one consignee.)

Base, Pittsburgh-Cleveland
(Per 100-lb. keg)

Standard wire nails	$2.35
Cement coated nails	2.35
Galvanized nails	3.85

(Per pound)

Polished staples	3.05c
Galvanized fence staples	3.30c
Barbed wire, galv.	2.85c
Annealed fence wire	2.35c
Galvanized fence wire	2.80c
Woven wire fencing (base column, c.l.)	$60.00
Plain wire, 6-9 gage to mfg. trade	2.20c

Anderson, Ind., Chicago up $1; Duluth up $2; Birmingham up $3.

Spring wire	3.20c

Chicago and Waukegan $1 higher, Worcester $2 higher.

Cold-Finished Carbon Bars

(To be advanced Jan. 1)

Base Pitts., one size, shape, grade, shipment at one time to one destination

10,000 to 19,999 lbs.	1.95c
20,000 to 59,999 lbs.	1.90c
60,000 to 99,999 lbs.	1.85c
100,000 lbs. and over	1.82½c

Chicago, Cleveland, Buffalo up 5c; Detroit up 20c; eastern Michigan up 25c.

Shafting □ □ □

(To be advanced Jan. 1)

Turned and ground, Pitts. base

1⅛-inch	3.25c
1 7/16 to 1½-inch	2.75c
1 9/16 to 1 7/8-inch	2.60c
1 15/16 to 2 7/8-inch	2.45c
2 1/16 to 6-inch	2.30c

Alloy Steel Bars □

Hot rolled

Pittsburgh, Buffalo, Chicago, Massillon, Canton	2.45c
Bethlehem	2.55c

S.A.E.	Alloy Diff.	S.A.E.	Alloy Diff.
2000	0.25	3100	0.55
2100	0.55	3200	1.35
2300	1.50	3300	3.80
2500	2.25	3400	3.20

4100 .15 to .25 Mo.	0.50
4600 .20 to .30 Mo. 1.25-1.75 Ni.	1.05
5100 .80-1.10 Cr.	0.45
5100 Cr. spring	base
6100 bars	1.20
6100 spring	0.70
Cr., Ni., Van.	1.50
Carbon van.	0.95
9250	carbon base plus extras

Strip and Hoops □

Hot strip to 23 1/2-in. Pittsburgh	1.75c
Do., Chicago	1.85c
Do., del. Detroit	1.95c
Do., del. Phila.	2.04c
Do., del. N. Y.	2.08c
Cooperage hoop, Pittsburgh	1.85c
Do., Chicago	1.95c
Cold-rolled strip, Pitts., Cleve.	2.40c
Worcester	2.60c

Rails, Track Material □

(Gross Ton)

Standard rails, mill	$36.37½
Relay rails, Pitts.	
20-45 lbs.	$26.00
50-60 lbs.	$23.00
70-75 lbs.	$18.00
80-85 lbs.	$24.00
100 lbs.	$25.00
Light rails, billet qual., Pitts., Chi.	$32.00
Do., reroll. qual.	$31.00
Angle bars, mills	2.55c
Spikes, R. R., base	2.40c
Track bolts, base	3.55c
Tie plates, base	1.90c

Base, light rails 25 to 40 lbs.; 50 to 60 lbs. inclusive up $5; 16 and 20 lbs., up $1; 12 lbs., up $2; 8 and 10 lbs., up $5. Base railroad spikes 200 kegs or more; base tie plates 20 tons or more; diff. for less.

Bolts and Nuts □ □

Pittsburgh, Cleveland, Birmingham, Chicago. Discounts to legitimate jobbing or large consuming trade for full case lots, Dec. 1, 1932, lists.

CARRIAGE BOLTS

All sizes, cut thread	70 off
Rolled thread, ½ x 6 and smaller	70 off

MACHINE BOLTS

All sizes, cut thread, lag screws, plow bolts, Nos. 1-2-3-7 heads, tap bolts, blank bolts, stud bolts without nuts	70 off
Tire bolts	60 off
Stove bolts, 72½-25-10 off in pkgs.; 85 off in bulk, 5000 or more of a size.	
Rolled thread machine bolts, ½ x 6 and smaller,	70 off
Step bolts	66 off
Elevator bolts	66 off

NUTS

Semifinished	70 off

HEXAGON CAP SCREWS

Milled	85 off
Upset 1-in., smaller	85-10 off

SQUARE HEAD SET SCREWS

Upset, 1-in., smaller	80 off
Upset, larger than 1-in.	80 off
Headless set screws	75-10 off

Rivets, Wrought Washers

Struc., c.l., Pittsburgh, Cleveland	2.75c
Struc., c.l., Chicago	2.85c
⅞-in. and smaller, Pitts., Chi., Cleve.	70 and 10 off
Wrought washers, Pitts., Chi., Phila.	6.00-6.25 off

Cut Nails, Piling □

Cut nails, Pitts.; (10% discount on size extras)	$2.75
Do. less carloads, 5 kegs or more; no discount on size extras	$3.00
Do., less than 5 kegs; no discount on size extras	$3.15
Steel piling, Pitts.	2.00c
Steel piling, Chi., Buff.	2.10c

Pipe and Tubing

Base $200 net ton, except on standard commercial seamless boiler tubes under 2 inches and cold drawn seamless tubing.

Welded Iron, Steel Pipe

Base discounts on steel pipe, Pitts., Lorain, O., to consumers in carloads. Gary, Ind., 2 points less. Chicago delivered 2½ points less. Wrought pipe, Pittsburgh base.

BUTT WELD

In.	Blk.	Gal.
Steel		
¼ and ⅜	57	38½
½	62	50½
¾	65½	55½
1—3	67½	58½
Iron		
½	31½	15
¾	36½	20½
1—1¼	39½	25½
2	41½	26

LAP WELD

Steel		
2	63½	54½
2½—3	66½	57½
3½—6	68½	59½
7 and 8	67½	57½
9 and 10	67	57
Iron		
2	37	22½
2½—3½	38	25
4—8	40	28½
9—12	38	24½

LINE PIPE

Steel	
⅛-inch, butt weld	50½
¼—⅜, butt weld	56
½, butt weld	61
¾, butt weld	64½
1—3, butt weld	66½
2-inch, lap weld	62½
2½—3, lap weld	65½
3½—6, lap weld	67½
7—8, lap weld	66½
Iron	

⅛—1½ inch, black and galv. take 4 pts. over; 2½—6 inch 2 pts. over discounts for same sizes, standard pipe list. 8—12 inch no extra.

BOILER TUBES

C. L. Discounts, f.o.b. Pitts.

Lap Weld Steel		*Charcoal Iron*	
2—2¼	33	1¾	8
2½—2¾	40	2—2¼	13
3	47	2½—2¾	16
3¼—3¾	50	3	17
4	52	3¾—3½	18
4½—6	42	4	20
1½	1	4½	21

In lots of a carload or more, above discounts subject to preferential of two 5% discounts on steel and 10% on charcoal iron.

Lapwelded steel: Under 10,000 lbs., 6 pts. under base and one 5%; on 10,000 lbs. to carload, 4 pts. under base and two 5%. Quantity discounts same as for hot-rolled. Charcoal iron: Under 10,000 lbs., 2 pts. under base; on 10,000 lbs. to carload, base and one 5%.

SEAMLESS BOILER TUBES

Cold Drawn			
2—2¼	27	3¼—3½	41
2½—2¾	34	4	46
3	38	4½, 5, 6	43

(On 1—1¾-inch sizes mechanical tubing dis. apply.)

Hot Rolled			
2—2¼	33	3¼—3½	47
2½—2¾	40	4	49
3	44	4½, 5, 6	42

Quantity discounts: Under 10,000 lbs., 10 pts. and 5%; 10,000 to 24,999 lbs., 6 pts. and 5%; 25,000 lbs. to carload, 2 pts. and 5 and 5%; carload and over, base discount and 5 and 5%. No extra for lengths 24 ft. and under.

Seamless Tubing □

Cold drawn; f.o.b. mill disc.

100 ft. or 150 lbs.	32%
15,00 ft. or 22,500 lbs.	70%

Cast Iron Water Pipe □

Class B Pipe—Per Net Ton

6-in. & over, Birm.	$36.00-37.00
4-in., Birm.	39.00-40.00
4-in., Chicago	47.00-48.00
6 to 24 in., Chicago	44.00-45.00
6-in. & over, east. fdy.	40.00
Do., 4-in.	43.00

Class A pipe $3 over Class B. Stand, fitgs., Birm. base..$90.00

Six to 24-inch, fittings, base; over 24-inch plus $20; 4-inch, plus $10; 3-inch, plus $20; gas pipe fittings, 5 higher.

Semifinished Steel □

Prices Per Gross Ton

BILLETS AND BLOOMS
4 x 4-inch base

Pitts., Chi., Cleve., open-hth. & bess.	$26.00
Philadelphia	31.30
Forging, Pitts., Chi.	31.00

SHEET BARS

Pitts., Cleve., Yong.	26.00
Chicago	26.00
Canton, O.	26.00

SLABS

Pitts., Cleve., Yong.	26.00

WIRE RODS

Pitts., Cleveland	36.00
Chicago	36.00

SKELP

All grades, Pitts. and Chicago	1.60c

Coke □ □ □

Price Per Net Ton

BEEHIVE OVENS

Connellsville fur.	$3.75
Connellsville fdry.	4.25
Connell. prem. fdry.	5.25
New River fdry.	6.00
Wise county fdry.	4.25- 5.00
Wise county fur.	3.50- 4.25

BY-PRODUCT FOUNDRY

Newark, N. J., del.	8.71- 9.31
Chi. ov., outside del.	8.50
Chicago, del.	9.25
New England, del.	10.50
*St. Louis, del.	9.25
Birmingham, ovens	5.00
Indianapolis, del.	8.75
Ashland, Ky., Connells, basis	5.50
Portsmouth, ovens, Connell. basis	5.50
Buffalo, ovens	7.50- 8.00
Detroit, ovens	8.00
Philadelphia, del.	9.00

Coke By-Products □

Per gallon, producers' plants.

Tank lots

	Spot
Pure benzol	$0.22
90 per cent benzol	0.22
Toluol	0.30
Solvent naphtha	0.26
Commercial xylol	0.26

Per lb. f.o.b. New York

Phenol (200 lb. drums)	0.163c
Do., (100 lb.)	0.173c

Per lb., producers' plants

Naphthalene flakes and balls	6.00- 7.25

Per 100 lb. Atlantic seaboard

Sulphate of ammonia	$1.25

Pig Iron

Delivered prices do not include switching charges except as noted. No. 2 foundry iron is 1.75-2.25 silicon; 25-cent differentials apply for each 0.25 silicon above 2.25

Gross Tons

	No. 2 Fdry.	Malleable	Basic	Bessemer
Basing Points:				
Bethlehem, Pa.	$18.50	$19.00	$18.00	$19.50
Birdsboro, Pa.	18.50	19.00	18.00	19.50
Swedeland, Pa.	18.50	19.00	18.00	19.50
Sparrows Point, Md.	18.50	.....	18.00	.....
From Swedeland, Pa., del. to Phila.	19.26	19.76	18.76	.....
From Bethlehem, del. to Brooklyn	20.77	21.27	.....	.....
From Bethlehem, del. to Newark, N. J.	19.99	20.39	.....	.....
Basing Point:				
Everett, Mass.	18.50	19.00	18.00	19.50
From Everett, del. to Boston	19.00	19.50	18.50	20.00
Basing Point:				
Buffalo	17.50	18.00	16.50	18.50
From Buffalo, del. to Boston	19.00	19.50	18.50	20.00
Basing Points:				
Neville Island, Pa.	18.00	18.00	17.50	18.50
Sharpsville, Pa.	17.50	17.50	17.00	18.00
Youngstown, O.	17.50	17.50	17.00	18.00
From Neville Island, Pa., del. to Pittsburgh district	(Neville Island base, plus 63c to $1.13 switching charges)			
Basing Points:				
Erie, Pa.	17.50	18.00	17.00	18.50
Cleveland	17.50	17.50	17.00	18.00
Toledo, O.	17.50	17.50	17.00	18.00
Detroit	17.50	17.50	17.00	18.00
From Detroit, del. to Saginaw, Mich.	19.60	19.60	19.10	20.10
From Cleveland, del. to Akron, Canton, O.	18.76	18.76	18.26	19.26
From Toledo, del. to Mansfield, O.	19.26	19.26	18.76	19.76
Basing Point:				
Hamilton, O.	17.50	17.50	17.00	18.00
From Hamilton, del. to Cincinnati	18.51	18.51	18.01	19.01
Do., del. to Indianapolis	19.77	19.77	19.27	20.27
Basing Points:				
Duluth	18.00	18.00	.....	18.50
Chicago	17.50	17.50	17.00	18.00
Granite City, Ill.	17.50	18.00	17.00	.....
From Duluth, del. to St. Paul	19.94	19.94	.....	20.44
From Chicago, del. to Milwaukee	18.50	18.50	18.00	19.00
From Chicago, Toledo or Detroit, del. to Muskegon, Mich.	20.40	20.40	19.90	20.90
From Granite City, del. to St. Louis	(Granite City base, plus 50-cent switching charge)			
Basing Point:				
Birmingham, Ala.	13.50	.....	12.50	.....
From Birmingham, del. to:				
Boston	18.62	.....	18.12	.....
Newark, N. J.	19.58	.....	.....	.....
Brooklyn, N. Y.	20.39	.....	.....	.....
Baltimore	19.02	.....	18.52	.....
Philadelphia	18.88	.....	18.38	.....
Cleveland	19.64	.....	18.64	.....
Cincinnati	18.23	.....	17.11	.....
Chicago	18.16	.....	19.14	.....
St. Louis	17.62	.....	17.50	.....
Basing Point:				
Provo, Utah	16.50	.....	.....	.....

LOW PHOS.

Basing points: Birdsboro, Pa., Steelton, Pa., and Standish, N. Y.—$23.00. Basing point: Johnson City, Tenn.—$23.00
Philadelphia, standard and copper bearing 24.13

GRAY FORGE		CHARCOAL	
Valley furnace	17.25	Lake Superior fur.	20.50
Pitts. dist. fur.	17.75	Do., del. Chicago	23.54

SILVERY

Jackson County, O., base; 6%—$22.25; 7—$23.25; 8—$24.25; 9—$25.25; 10—$26.25; 11—$27.75.

BESSEMER FERROSILICON

Jackson County, O., base: 10%—$27.25; 11—$28.75; 12—$30.25; 13—$31.75; 14—$33.25; 15—$34.75; 16—$36.25.

Iron Ore □ □

LAKE SUPERIOR ORE
Gross ton, 51½%, Lower Lake Ports

Old range bess.	$4.30
Mesabi bessemer	4.65
Old range nonbess.	4.65
Mesabi nonbess.	4.50
High phosphorus	4.40

EASTERN LOCAL ORES
Cents, unit, del. E. Pa.

Foundry and basic, 56-63%, con. (nom.)	8.00- 9.00
Cop.-free low phos. 58-65% (nom.)	10.00-10.50

FOREIGN ORE
Cents per unit, f.a.s. Atlantic ports (nom.)

Foreign manganiferous ore, 45-55% iron, 6-10% man.	10.00
No. Afr. low phos.	9.50
Swedish basic, 65%	9.00
Swedish low phos.	9.50
Spanish No. Africa basic, 50 to 60%	9.00
Tungsten, spot, sh. ton unit, duty pd.	$14.00-14.25
N. F. fdy., 55%	7.00
Chrome ore, 48% gross ton, c.i.f.	$18.00

Manganese Ore □

(Nominal)

Prices, not including duty, cents per unit, cargo lots.

Caucasian, 52-55%	22.00
So. African, 52%	21.00-22.00
So. Afr., 49-51%	20.00-21.00
Indian, 48-50%	nominal

Refractories □ □

FIRE CLAY BRICK
per 1000 f.o.b. Works
First Quality

Pa., Ohio, Ill., Ky., Md., Ga., Mo.	$45.00
Alabama	48.00

Second Quality

Pa., Ohio, Ill., Ky., Md., Mo., Ga., Ala.	40.00

MALLEABLE BUNG BRICK

All bases	50.00

SILICA BRICK

Pennsylvania	$45.00
Joliet, E. Chicago	54.00
Birmingham, Ala.	55.00

MAGNESITE BRICK
Per Net Ton, 9 x 4½ x 2½

Burned	$65.00
Unburned	55.00

CHROME BRICK
Per Net Ton

F.o.b. ship. point	$45.00

MAGNESITE

Dead burned grain, Chester, Pa., Baltimore bases, net	40.00
Domes, Chewelah, Wash., base	22.00

Fluorspar □ □

85 and 5 per cent grade

Washed gravel, duty paid, tide, gross ton	$21.00
Washed gravel, f.o.b. Ill., Ky., net ton, carloads	$14.75-15.00

Ferroalloys □ □

(In dollars, except Ferrochrome)

Ferromanganese, 78-82% tidewater, duty pd.	82.00
del. Pitts.	87.24
Spiegeleisen, 19-20%, dom., fur., spot†	27.00
Ferrosilicon, 50%, freight all., c. l.	74.50
Do., less carload	82.50
Do, 75 per cent	120-130.00
Spot, $5 a ton higher.	
Silicomang., 2½ carb.	85.00
2% carbon	90.00
1% carbon	100.00
Ferrochrome, 66-70 chromium, 4-6 carbon, cts. lb. con. del.	9.50
Do, spot del.	10.00
Ferrotungsten, stand., lb. cont.	1.16- 1.25
Ferrovanadium, 35 to 40%, lb. cont., on analysis	2.60- 2.80
Ferrotitanium, c. l., prod. plant, frt. allow., net ton	137.50
Spot, 1 ton., frt., all., lb	7.00
Do, under 1 ton	7.50
Ferrophosphorus, per ton, c. l. 17-19%, Rockdale, Tenn., basis; 18%, $2 unitage	50.00
Ferrophosphorus, electrolytic, per ton c. l., 23-26% f.o.b. Anniston, Ala., 24% $2.75 unitage	65.00
Ferromolybdenum, stand, 50-60%, lb.	0.95
Molybdate, lb. cont.	0.80

†Carloads. Quan. diff. apply.

Nonferrous Mill Products

F.o.b. mill base, cents per lb., except as specified. Copper, brass products based on 8.00c *Con., copper*

Sheets	
*Yellow brass (high)	13.50
*Copper, hot rolled	14.50
Lead, cut, to jobbers	8.00
Zinc, 100-lb. base	9.00
Tubes and Pipes	
*High yellow brass	16.00
*Seamless copper	16.00
Rods	
*High yellow brass	11.75
*Copper, hot rolled	12.00
Anodes	
*Copper, untrimmed	12.25
Wire	
*Yellow brass (high)	14.00

Old Metals □ □

Deal, buying prices, cents lb.

No. 1 Composition Red Brass	
New York	4.25- 4.50
Chicago	4.00- 4.25
Cleveland	4.50- 5.00
*St. Louis	4.00- 4.25
Heavy Copper and Wire	
New York	5.75- 6.00
Chicago, No. 1	5.50- 5.75
Cleveland	5.00- 5.50
*St. Louis	5.00
Composition Brass Borings	
New York	4.12½-4.37½
Light Copper	
New York	5.00- 5.25
Chicago	4.25- 4.50
Cleveland	4.50- 5.00
St. Louis	4.25
Light Brass	
Chicago	2.50- 2.75
Cleveland	2.50- 3.00
Lead	
New York	3.00- 3.25
Cleveland	2.75- 3.00
Chicago	2.87½-3.12½
*St. Louis	2.75- 3.00
Zinc	
New York	2.25- 2.50
Cleveland	2.25- 2.50
Chicago	2.00- 2.25
St. Louis	2.25- 2.50
Aluminum	
Clips, soft, Cleve.	12.00-12.50
Borings, Cleve.	5.00- 6.00
Mixed, cast, Cleve.	7.75- 8.25
*Mixed, cast, St. L.	7.25- 7.75

Secondary Metals □

Brass ingot, 85-5-5-5	8.25
Remelt Al., No. 12	12.00-12.50

Iron and Steel Scrap Prices

Corrected to Friday night. Gross tons delivered to consumers, except where otherwise stated

HEAVY MELTING STEEL	
Birmingham	9.00- 9.50
Boston, dealers	5.00- 5.25
Buffalo, No. 1	9.25-10.00
Buffalo, No. 2	8.00- 8.50
Chicago	8.50- 9.00
Cleveland, No. 1	9.00- 9.50
Cleveland, No. 2	8.50- 9.00
Detroit, No. 1	7.00- 7.50
Detroit, No. 2	6.25- 6.75
Eastern Pa.	10.00-10.50
Eastern Pa., No. 2	8.00- 8.50
Federal, Ill.	7.75- 8.25
Granite City, Ill.	8.25- 8.75
N. Y., deal. R. R.	7.50
N. Y., deal. No. 2	6.50
Pittsburgh, No. 1	12.50-13.00
St. Louis, No. 1 del.	8.75- 9.25
Valleys, No. 1	11.50-12.00

COMPRESSED SHEETS	
Buffalo, dealers	8.00- 8.50
Chicago, factory	7.00- 7.50
Cleveland	8.25- 8.75
Detroit	7.00- 7.50
E. Pa., new mat	9.00-19.00
Pittsburgh	12.25-12.75
Valleys	11.00-11.50

BUNDLED SHEETS	
Buffalo	5.50- 6.00
Cincinnati, del.	5.50- 6.00
Cleveland	6.25- 6.75
Pittsburgh	10.75-11.25
St. Louis	5.00- 5.50

SHEET CLIPPINGS LOOSE	
Chicago	5.00- 5.25
Cincinnati	4.50- 5.00
Detroit	5.00- 5.50
St. Louis	4.50- 5.00

STEEL RAILS, SHORT	
Birmingham	11.00-11.50
Boston, dealers	5.00- 5.25
Buffalo	12.00-12.50
Chicago (3 ft.)	10.50-11.00
Chicago (2 ft.)	11.50-12.00
Cincinnati, del.	11.00-11.50
Detroit	8.50- 9.00
Pitts., (open-hearth, 3 ft. and less	14.00-14.50
St. Louis	12.00-12.50

STOVE PLATE	
Birmingham	7.00- 7.50
Boston, dealers	4.50- 4.75
Buffalo	9.00- 9.50
Chicago, net	6.00- 6.50
Cincinnati, dealers	6.00- 6.50
Detroit, net	4.50- 5.00
Eastern Pa.	7.50- 8.00
N. Y., deal., fdry	5.00- 5.50
St. Louis	6.50- 7.00

COUPLERS, SPRINGS	
Buffalo	11.50-12.00
Chicago, springs	10.50-11.00
Eastern Pa.	13.00
Pittsburgh	14.00-14.50
St. Louis	10.00-10.50

ANGLE BARS—STEEL	
Chicago	10.00-10.50
St. Louis	9.50-10.00

LOW PHOSPHORUS	
Buffalo, billets and bloom crops	11.50-12.50
Cleveland, billet, bloom crops	12.50-13.50
Eastern Pa. crops	14.00-14.50
Pittsburgh billet bloom crops	16.00-16.50
Pittsburgh, sheet bar crops	13.50-14.00

FROGS, SWITCHES	
Chicago	8.50- 9.00
St. Louis	9.50-10.00

SHOVELING STEEL	
Chicago	8.50- 9.00
St. Louis	7.75- 8.25

RAILROAD WROUGHT	
Birmingham	7.00- 8.00
Boston, dealers	2.00- 2.50
Buffalo, No. 1	7.00- 8.00
Buffalo, No. 2	9.50-10.00
Chicago, No. 1, net	7.50- 8.00
Chicago, No. 2	8.50- 9.00
Cincinnati, No. 2	8.00- 8.50
Eastern Pa.	11.00
N. Y., No. 1 deal	7.00- 7.50
Pittsburgh, No. 1	12.50-13.00
St. Louis, No. 1	6.00- 6.50
St. Louis, No. 2	8.25- 8.75

SPECIFICATION PIPE	
Boston	4.00- 4.50
Eastern Pa.	9.50
New York, dealers	4.75- 5.25

BUSHELING	
Buffalo, No. 1	8.00- 8.50
Chicago, No. 1	7.25- 7.75
Cinci., No. 1 deal	5.75- 6.25
Cincinnati, No. 2	2.50- 3.00
Cleveland, No. 2	7.00- 7.25
Detroit, No. 1 new	6.25- 6.75
St. Louis, No. 1	6.50- 7.00
Valleys, new No. 1	10.50-11.00

MACHINE TURNINGS	
Birmingham	3.50- 4.50
Boston, dealers	1.75- 2.00
Buffalo	6.25- 6.50
Chicago	5.00- 5.50
Cincinnati, dealers	4.50- 5.00
Cleveland	7.00- 7.50
Detroit	5.50- 6.00
Eastern Pa.	6.00- 6.50
New York, dealers	2.50- 3.00
Pittsburgh	8.25- 8.75
St. Louis	4.25- 4.75
Valleys	7.00- 7.50

BORINGS AND TURNINGS *For Blast Furnace Use*	
Boston, dealers	1.75- 2.00
Buffalo	6.50- 7.25
Cincinnati, dealers	4.50- 5.00
Cleveland	7.00- 7.50
Detroit	5.50- 6.00
Eastern Pa.	5.50- 6.00
New York, dealers	2.00- 2.50
Pittsburgh	7.50- 8.00

CAST IRON BORINGS	
Birming., plain	4.00- 4.50
Boston, chemical	8.50- 9.00
Boston, dealers	3.25- 3.50
Buffalo	6.50- 7.00
Chicago	5.50- 6.00
Cincinnati, dealers	4.50- 5.00
Cleveland	7.00- 7.50
Detroit	5.50- 6.00
E. Pa., chemical	12.00-15.00
New York, dealers	3.00
Pittsburgh	8.00- 8.50
St. Louis	4.00- 4.50

PIPE AND FLUES	
Cincinnati, dealers	4.00- 4.50

RAILROAD GRATE BARS	
Buffalo	5.00- 5.50
Chicago, net	6.50- 7.00
Cincinnati	4.75- 5.25
Eastern Pa.	7.50- 8.00
New York, dealers	4.25- 4.50
St. Louis	5.50- 6.00

FORGE FLASHINGS	
Boston, dealers	3.75- 4.00
Buffalo	8.00- 8.50
Cleve., over 10-in	8.50- 9.00
Detroit	5.50- 6.00

FORGE SCRAP	
Boston, dealers	3.75- 4.00
Chicago, heavy	10.00-10.50
Eastern Pa.	10.00-10.50

ARCH BARS, TRANSOMS	
Chicago, net	6.50- 7.00
St. Louis	9.00- 9.50

AXLE TURNINGS	
Boston, dealers	3.50- 3.75
Buffalo	7.50- 8.00
Chicago, elec. fur	8.00- 8.50
Cleveland	9.00- 9.50
Eastern Pa.	9.00-10.00
St. Louis	5.00- 5.50

STEEL CAR AXLES	
Birmingham	11.00-11.50
Boston, ship. point	8.00- 8.50
Buffalo	10.00-11.00
Chicago, net	10.00-10.50
Eastern Pa.	14.00
St. Louis	11.00-11.50

SHAFTING	
Boston, ship. point	8.25- 8.50
Eastern Pa.	14.00-14.50
New York, dealers	9.50-10.00
St. Louis	9.00- 9.50

CAR WHEELS	
Birmingham, iron	8.00- 9.00
Boston, iron deal	6.00- 6.50
Buffalo, iron	9.00- 9.50
Buffalo, steel	11.00-11.50
Chicago, iron	9.50-10.00
Chi., rolled steel	10.00-10.50
Cincinnati, iron	8.00- 8.50
Eastern Pa., iron	11.00-11.50
Eastern Pa., steel	13.00
Pittsburgh, iron	11.00-11.50
Pittsburgh, steel	14.00-14.50
St. Louis, iron	8.00- 8.50
St. Louis, steel	9.50-10.00

NO. 1 CAST SCRAP	
Birmingham	9.00-10.00
Boston, No. 2	5.00- 5.50
Boston, tex. con	10.25-10.50
Buffalo, cupola	10.00-10.50
Buffalo, mach.	10.50-11.00
Chicago, agri. net	7.00- 7.50
Chicago, mach. net	8.50- 9.00
Chicago, railroad net	7.50- 8.00
Cinci., mach. cup	8.00- 8.50
Cleveland, cupola	8.50- 9.00
Detroit, net	7.00 7.50
Eastern Pa., cupola	11.00-11.50
N. Y., cup. deal	6.00- 6.50
N. Y., del. local foundries	9.00- 9.50
Pittsburgh, cupola	12.00-12.50
San Francisco, del	13.50-14.00
Seattle	4.50- 6.50
St. Louis, No. 1	8.00- 8.50
St. L., No. 1 mach	8.50- 9.00

HEAVY CAST	
Boston, del.	5.00- 5.50
Buffalo, break	7.00- 7.50
Cleveland, break	6.75- 7.00
Detroit, break	5.00- 5.50
Detroit, auto net	8.00- 8.50
Eastern Pa.	10.00
N. Y., No. 1, deal	6.50- 7.00
N. Y., break. deal	6.00- 6.50
Pittsburgh	11.00-11.50

MALLEABLE	
Boston, consum	12.00-12.25
Buffalo	10.00-11.00
Chicago, R. R.	9.50-10.00
Cinci., agri. del	8.00- 8.50
Cinci., R. R. del	8.50- 9.00
Cleveland, rail	11.00-11.50
Detroit, auto	6.50- 7.00
St. Louis, R. R.	8.50- 9.00
Eastern Pa., R. R.	11.50-12.50

RAILS FOR ROLLING *5 feet and over*	
Birmingham	10.00-11.00
Boston, dealers	7.00- 7.25
Buffalo	9.00- 9.50
Chicago	10.00-10.50
Eastern Pa.	12.50
New York, dealer	6.50- 7.00
St. Louis	10.00-10.50

LOCOMOTIVE TIRES	
Chicago (cut)	10.00-10.50
St. L., No. 1	8.00- 8.50

LOW PHOS. PUNCHINGS	
Buffalo	11.00-11.50
Chicago	11.50-12.00
Eastern Pa.	12.50-13.50
Pittsburgh	14.00-14.50

Nonferrous Metal Prices of the Week

Spot unless otherwise specified. Cents per pound

	Copper: Electro., del. Conn.	Copper: Lake, del. Midwest	Copper: Casting, refinery	Straits Tin: New York Spot	Straits Tin: New York Futures	Lead: New York N. Y.	Lead: East St. L.	Zinc St. L.	Aluminum 98-99%	Antimony Spot, N. Y.	Ingot Nickel
Dec. 9	8.00	8.12½	7.75	53.25	54.00	4.15	4.05	4.50	*22.90	7.25	35.00
Dec. 11	8.00	8.12½	7.75	53.10	53.70	4.15	4.05	4.50	*22.90	7.25	35.00
Dec. 12	8.00	8.12½	7.75	52.25	52.85	4.15	4.05	4.50	*22.90	7.25	35.00
Dec. 13	8.00	8.12½	7.75	52.35	52.95	4.15	4.05	4.50	*22.90	7.25	35.00
Dec. 14	8.00	8.12½	7.75	53.00	53.60	4.15	4.05	4.50	*22.90	7.12½	35.00
Dec. 15	8.12½	8.25	7.87½	53.37½	53.97½	4.15	4.05	4.50	*22.90	7.12½	35.00

*Nominal quotation. Market range 19.90c to 22.90c.

Warehouse Iron and Steel Prices

Cents per pound for delivery within metropolitan districts of cities specified

STEEL BARS	□
Baltimore*	2.75c
Boston††	2.90c
Buffalo	2.95c
Chattanooga..	3.05c
Chicago	2.90c
Cincinnati	3.10c
Cleveland	2.90c
Detroit	2.98½c
Houston	3.00c
Los Angeles..	3.40c
New Orleans	3.00c
New York‡(d)	3.17c
Pittsburgh	2.85c
Philadelphia*	2.75c
San Francisco	3.55c
Seattle	3.40c
St. Louis	3.14c
St. Paul	3.00c
Tulsa	3.25c

IRON BARS	□
Portland	3.40c
San Fran.	3.55c
Baltimore*	2.75c
Baltimore* ..	2.60c
Chattanooga..	3.05c
Chicago	2.75c
Cincinnati	3.10c
Detroit	2.98½c
New York‡(d)	3.10c
Philadelphia*	2.75c
St. Louis	3.14c
Tulsa	3.25c

REINFORC. BARS	□
Boston 2.75c-3.25c	
Buffalo	1.95c
Chattanooga..	3.05c
Chicago 1.95c-2.10c	
Cincinnati	3.10c
Cleveland	2.22½c
Houston	3.00c
Los Ang., cl...	3.10c
New Orleans	3.00c
New York	3.17c
Philadelphia..	2.62½c
Pitts., plain..	3.00c
Pitts., twisted sqs.	3.12½c
Seattle	3.50c
St. Louis	3.29c
Tulsa	3.25c
Young. 2.30c-2.60c	

SHAPES	□
Baltimore* ..	2.60c
Boston††	3.07c
Buffalo	3.20c
Chattanooga..	3.30c
Chicago	3.10c
Cincinnati	3.30c
Cleveland	3.21c
Detroit	3.30c
Houston	3.00c
Los Angeles..	3.40c
New Orleans	3.50c
New York(d)	3.27c
Philadelphia*	2.75c
Pittsburgh	3.05c
Portland	3.40c
San Francisco	3.50c
Seattle	3.40c
St. Louis	3.34c
St. Paul	3.25c
Tulsa	3.50c

PLATES	□
Baltimore*	2.75c
Boston††	3.08c
Buffalo	3.20c
Chattanooga..	3.30c
Chicago	3.10c
Cincinnati	3.30c
Cleveland, ¼ in. and thicker	3.21c
Cleve., ⅜-in.	3.20c
Detroit	3.30c
Det., ⅜-in.....	3.10c
Houston	3.00c
Los Angeles..	3.40c
New Orleans	3.50c
New York(d)	3.30c
Philadelphia*	2.75c
Phila. floor....	4.35c
Pittsburgh	3.05c
Portland	3.40c
San Fran.	3.50c
Seattle	3.40c
St. Louis	3.34c
St. Paul	3.25c
Tulsa	3.50c

NO. 10 BLUE	□
Baltimore* ...	2.95c
Boston††	2.90c
Buffalo	3.10c
Chattanooga..	3.50c
Chicago	2.95c
Cincinnati	3.10c
Cleveland	3.01c
Det., 8-10 ga.	3.03½c
Houston .....:	3.60c
Los Angeles..	3.65c
New Orleans	3.50c
New York	3.17c
Portland	3.65c
Philadelphia*	2.95c
Pittsburgh	2.85c
San Fran.	3.75c
Seattle	3.65c
St. Louis 3.19c-3.36c	
St. Paul	3.45c
Tulsa	3.70c

NO. 24 BLACK	□
Baltimore*†...	3.50c
Boston††	3.75c
Buffalo	3.25c
Chattanooga..	4.00c
Chicago	3.70c
Cincinnati	3.85c
Cleveland	3.76c
Detroit	3.78½c
Los Angeles..	4.15c
New York	3.65c
Philadelphia*†	3.40c
Pittsburgh	3.35c
Portland	4.25c
San Fran.	4.25c
Seattle	4.25c
St. Louis	3.94c
St. Paul	3.695c
Tulsa	4.75c

NO. 24 GAL. SHEETS	□
Baltimore*†...	3.75c
Buffalo	4.00c
Boston	4.60c
Chattanooga..	4.25c
Chicago 4.20c-4.30c	
Cincinnati	4.45c
Cleveland	4.36c
Detroit	4.45c
Houston	3.57c
Los Angeles..	4.75c
New Orleans	4.35c
New York	4.25c
Pitts.** 3.90c-4.20c	
Portland	4.85c
San Fran.	4.85c
Seattle	4.85c
St. Louis	4.54c
St. Paul	4.19c
Tulsa	5.10c
Phila.*†	4.00c

BANDS	□
Baltimore	3.05c
Boston††	3.15c
Buffalo	3.30c
Chattanooga..	3.25c
Chicago	3.20c
Cincinnati	3.35c
Cleveland	3.26c
Detroit, ⅜-in. and lighter	3.28½c
Houston	3.25c
Los Angeles..	3.80c
New Orleans	3.20c
New York(d)	3.42c
Philadelphia...	3.05c
Pittsburgh	3.10c
Portland	3.90c
San Fran.	3.15c
Seattle	3.90c
St. Paul	3.20c
Tulsa	3.45c
St. Louis	3.44c

HOOPS	□
Baltimore	2.80c
Boston	4.15c
Buffalo	3.55c
Chicago	3.20c
Cincinnati	3.35c
Det., No. 14 and lighter	3.28½c
New York	3.42c
Philadelphia...	3.30c
Pittsburgh	3.75c
Seattle	5.40c
St. Paul	3.75c

COLD FIN. STEEL	□
Baltimore(c)	3.56c
Boston 3.83c-4.33c	
Buffalo	3.25c
Chattanooga*	3.90c
Chicago	3.35c
Cincinnati	3.55c
Cleveland	3.25c
Detroit	3.40c
Los Ang. (f)	5.95c
New Orleans	4.25c
New York	3.79c
Philadelphia..	3.58c
Pittsburgh	3.20c
Portland (f)..	4.75c
San Fran. (f)	5.95c
Seattle (f)....	4.75c
St. Paul	3.20c
St. Louis.....	3.44c
Tulsa	4.65c

COLD ROLL. STRIP	□
Boston, 0.100-in., 500 lb. lots	5.20c
Buffalo	5.25c
Chicago (b)..	5.65c
Cincinnati	5.80c
Cleveland (b)	5.55c
Detroit	5.40c
Philadelphia..	4.55c
New York.....	4.55c
St. Louis	5.74c

(b) Net base, straightening, cutting, boxing, 1 ton or more.

(c) Plus mill, size and quantity extras.

(d) Minus quant. diff.

(e) New mill classif.

(f) Rounds only.

‡Domestic bars.

*Plus quan. extras.

**Under 25 bundles.

*†50 or more bundles.

†New extras apply.

††Base 40,000 lbs., extras on less.

Prices at Detroit, Cleveland, Chicago, Pittsburgh, Cincinnati, Chattanooga, NewYork, Boston, St. Louis on heavier lines are subject to new quantity differentials:

399 pounds and less, up 50 cents; 400 to 9999 pounds, base; 10,000 to 19,999 pounds, 15 cents under; 20,000 to 39,999 pounds, 25 cents under; 40,000 pounds and over, 35 cents under base.

Current Iron and Steel Prices of Europe

Dollars at Rates of Exchange, Dec. 14

Export Prices f. o. b. Ship at Port of Dispatch—By Cable (or Radio)

	British gross tons U. K. ports	£ s d	Continental Channel or North Seaports, metric tons Gold parity, $4.8665	£ s d
PIG IRON				
Foundry, 2.50-3.00 Silicon.	$14.97	2 18 6	$8.88	1 16 6
Basic bessemer.....	15.82	2 14 0*	7.30	1 10 0
Hematite, Phos. .03-.05....	15.36	3 0 0	....	.....
SEMIFINISHED STEEL				
Billets.....	$28.16	5 10 0	$11.44	2 7 0
Wire rods, No. 5 gage.....	39.94	7 16 0	21.90	4 10 0
FINISHED STEEL				
Standard rails.....	$39.68	7 15 0	$26.77	5 10 0
Merchant bars.....	1.57c	6 17 6	.69c	3 2 6
Structural shapes.....	1.69c	7 7 6	.63c	2 17 6
Plates, †¼ in. or 5 mm.....	1.83c	8 0 0	.89c	4 1 0
Sheets, black, 24 gage or 0.5 mm.....	2.12c	9 5 0	1.27c	5 15 0
Sheets, gal., 24 gage, corr...	2.58c	11 5 0	1.60c to 1.76c	7 5 0 to 8 0 0
Bands and strips.....	1.83c	8 0 0	.83c	3 15 0
Plain wire, base.....	2.12c	9 5 0	1.18c	5 7 6
Galvanized wire, base.....	2.52c	11 0 0	1.38c to 1.40c	6 5 6 to 6 7 6
Wire nails, base.....	2.75c	12 0 0	1.27c	5 15 0
Tin plate, box 108 lbs.....	$ 4.22	0 16 6	.....	.....

British ferromanganese $82 delivered Atlantic seaboard, duty-paid. German ferromanganese £9 0s 0d $(43.74) f.o.b.

Domestic Prices at Works or Furnace—Last Reported

		£ s d		French Francs		Belgian Francs		Reich Marks
Fdy. pig iron, Si. 2.5.....	$16.00	3 2 6(a)	$13.18	215	$13.27	305	$23.31	63
Basic bessemer pig iron....	16.64	3 5 0(a)*	11.34	185	12.62	290	25.72	69.50
Furnace coke.....	3.84	0 15 0	7.36	120	4.79	110	7.12	19.25
Billets.....	28.16	5 10 0	24.83	405	19.14	440	35.71	96.50
Standard rails.....	1.89c	8 5 0	1.96c	700	2.20c	1,100(b)	2.22c	132
Merchant bars.....	1.72c	7 10 0	1.57c	560	1.07c	535	1.85c	110
Structural shapes.....	2.01c	8 15 0	1.54c	550	1.07c	535	1.81c	107.50
Plates,†¼-in. or 5 mm.....	1.95c	8 10 0	1.90c	680	1.35c	675	2.13c	127
Sheets, black.....	2.35c	10 5 0‡	2.38c	850‡	1.50c	750‡	2.42c	144‡
Sheets, galv., corr., 24 ga. or 0.5 mm.....	2.92c	12 15 0	4.06c	1,450	3.00c	1,500	6.22c	370
Plain wire.....	2.12c	9 5 0	3.16c	1,130	2.20c	1,100	2.97c	177
Bands and strips.....	2.40c	10 10 0	1.82c	650	1.35c	675	2.13c	127

*Basic. †British ship-plates. Continental, bridge plates. §24 ga. ‡1 to 3 mm. basic price. British quotations are for basic open-hearth steel. Continental usually for basic-bessemer steel. a del. Middlesbrough. b Since January.

Bars

Bar Prices, Page 42

Pittsburgh — Negotiations for first quarter bar contracts have not started but consumers have been specifying fully on fourth quarter contracts. Bar mills expect to complete shipments on all unfilled balances by Dec. 31.

Automotive consumers were in the market last week for some rush tonnages of alloy steel bars, one manufacturer having received several attractive orders for silico-manganese bars for the new spring suspension wheel for 1934 models. Alloy bars are based on 2.45c, Pittsburgh, and other basing points, with the exception of Bethlehem, Pa.

Cleveland—December specifications to bar mills here are at the high point of the year, due mainly to completion of fourth quarter contracts, as all material must be shipped by Dec. 31. Many consumers covered fourth quarter requirements under the flexible, percentage form of contract, whereby unspecified tonnage might be cancelled. The fact that most have specified fully, makers say, reflects actual demand for early 1934 manufacturing operations. Some bar mills have closed contracts for first quarter with 50 per cent of their regular customers.

Chicago—Soft steel bar specifications are moderately heavier, aided by better demand from miscellaneous consumers and the automotive industry. Business from the latter group still reflects light operations and the carry-over of material received against previous contracts. Farm implement manufacturers are increasing requirements slowly. Interest in first quarter requirements of all classes of bar users is light and only small lots have been booked for that period. The market continues 1.80c, Chicago for soft steel bars and 1.70c for rail steel.

Boston — Commercial steel bar buyers are specifying heavier against 1.60c, Pittsburgh, contracts, stocking moderately in numerous instances before the advance effective Jan. 1. Actual consumption by bolt and nut makers and most forging shops has not increased materially.

Philadelphia — Indications point to bar specifications this week as being the heaviest this quarter. An improvement has been noted over the past several days and this gain is expected to continue as only a couple of weeks remain for consumers to get shipments on contracts at least $2 a ton under the going market of 1.75c, Pittsburgh, or 2.04c, Philadelphia.

Plates

Plate Prices, Page 42

Pittsburgh—Award of a large tonnage of heavy plates, many of which run to a single size, has been made to a leading Pittsburgh mill by American Locomotive Co. for fabricating the Tri-Borough bridge towers, New York. Some of these plates, calling for 172-inch widths, however, will be sublet and rolled likely by an Eastern Pennsylvania plate mill.

River barge interests have little prospect of orders. Dewey Cement Co., Kansas City, Mo., has definitely dropped its inquiry for six steel barges. Even government floating equipment inquiries are few. Last week Dravo Contracting Co., Neville Island, Pittsburgh, received an order to widen the 136 x 24 x 5-foot towing steamer JAMES F. MCINDOE for the St. Louis engineers, the job to require a small unstated tonnage of plates.

Plates continue firm at 1.70c, Pittsburgh, and buyers are in the midst of specifying fully on their unexpired balances at 1.60c, Pittsburgh. Shipments on these lower priced contracts must be completed by Dec. 31.

Cleveland—Steel requirements for railroad freight cars and locomotives represent the most active feature of the market. For the 13,000 freight cars on which the Van Sweringen lines and others are issuing specifications, approximately 260,000 tons of rolled steel will be needed, including a large portion of plates. For 30 locomotives active in the market, about 1200 tons of plates are required. Consumers are contracting slowly for fourth quarter, because they have ten days' notice in the event of a price rise. Shipments will be heavy on fourth quarter contracts right up to Jan. 1.

Chicago—Outlook in the plate market is brightened by a prospective increase in railroad equipment building and freight car repair work. Demand for these uses recently has been quiet. Water tank awards are few considering the number of such projects involved in public works activity. Practically no brewery tank business is appearing, with no new inquiries for river barges and awards on pending business of this type are deferred.

Boston—Plate buyers, including railroads, are covering at 1.80c, Coatesville, Pa., with indications that carriers will take more tonnage next quarter for repairs. Specifications have been light, but specific requirements for large tanks, including oil and water storage, are heavier than expected.

Philadelphia — Plate operations were up in this district, reflecting primarily increasing specifications against contracts, against which shipments are due to be completed by Dec. 31. Baldwin Locomotive Works is scheduled to take action in about a month on rolled material for the 10 locomotives recently booked for the Northern Pacific. Car buying is more promising.

Announcement is expected momentarily of the award of about 900 tons of plates for three coast guard cutters to be built by Pusey & Jones, Wilmington, Del. Nine coast guard cutters may be up for new bids. Interest is being revived in the ferry boat for the county of Norfolk, Virginia, requiring approximately 300 tons of plates, shapes and bars.

New York—Plate sellers regard first-quarter prospects as excellent. Contracting is better and substantial railroad equipment buying is relied on to roll up a large tonnage.

Contracts Placed

1500 tons, tunnel lining, San Francisco-Oakland bridge, contract No. 5, Yerba Buena Island, to Columbia Steel Co., San Francisco.

900 tons, tunnel liners for metropolitan water district, Los Angeles, to McClintic-Marshall Corp., Bethlehem, Pa.

325 tons, wrought iron plates for roller top gate for the Marmet, W. Va., dam, to A. M. Byers Co., Pittsburgh, through Dravo Contracting Co., Neville island, Pittsburgh.

300 tons, oil storage tanks for United States navy, San Diego, Calif., to Chicago Bridge & Iron Works, Chicago.

250 tons, boilers, state hospitals, Massachusetts, to International Boiler Works, Framingham, Mass.

220 tons, 20 buoys, lighthouse bureau, to W. B. Scaife & Son, Pittsburgh.

200 tons, boilers for Times building, Los Angeles, to unnamed interests.

175 tons, water tank, Stillwater, Okla., to Graver Tank & Mfg. Corp., East Chicago, Ind.

150 tons, repair work S. S. HAMLIN F. MCCORMICK, to Todd Dry Docks Inc., Seattle.

125 tons, water tank, Paxton, Mass., to Chicago Bridge & Iron Works, Chicago.

100 tons, 200,000-gallon standpipe, Latham water district, Colonie, N. Y., to Chicago Bridge & Iron Works, Chicago; Solomon & Keis, Troy, N. Y., engineers.

100 tons, distillery, Clinton, Mass., to Acme Equipment Corp., Boston.

Contracts Pending

Unstated tonnage, shapes and plates, water tank and tower, veterans' hospital, Roanoke, Va.; Tippett & Wood, Phillipsburg, N. J., low, $8526, bids Dec. 1.

Northwest Magnesite Co., Chewelah, Wash., recently shipped a trainload

of magnesite to Seattle, for water shipment to Baltimore.

Railroads

Track Material Prices, Page 43

Buying of 12,775 freight cars, 167 passenger cars and 30 locomotives is forecast by allotments of $36,307,500 for loans by the public works administration to four railroads. These are the first loans to railroads for equipment purchases and bring total railroad loan allotments to $176,807,500. Loans are subject to approval by the interstate commerce commission.

The Erie will be loaned $18,065,000 and has settled its program at 3775 freight cars, hoppers, box, automobile and other types, 125 passenger cars and eight baggage and mail cars.

Chesapeake & Ohio has been allotted $18,065,000 and the Nickel Plate $5,028,500. These two roads are expected to announce their program involving 7000 to 8000 cars, this week. Northern Pacific has been allotted $1,250,000 and has practically closed with Baldwin Locomotive Works, Philadelphia for ten locomotives.

It is estimated the steel needed for the bodies of the freight cars will total about 250,000 tons and for the wheels and trucks about 75,000 tons.

Lehigh & New England is inquiring for 250 steel box cars, 150 steel hoppers of 50 tons capacity and 100 composite gondolas of 50 tons.

Recent rail buying includes 2700 tons of street railway rails for the city of Detroit, to Bethlehem Steel Co.; 2000 tons of 90-pound rail and 4800 pairs of rail joints for the Western Maryland, reported placed with Carnegie Steel Co.; 500 tons of 100-pound rails for the Clinchfield, placed with Tennessee Coal, Iron & Railroad Co., Birmingham, Ala. The latter road is expected to place 2000 tons additional.

Western Pacific is taking bids on 20,000 tons of 85 and 112-pound rails and 6000 tons of fastenings.

The Pennsylvania has awarded 13,000 tons of tie plates to Republic Steel Corp., Youngstown, O., and 12,000 tons to Weirton Steel Co., Weirton, W. Va. The remainder of its 50,000 tons of miscellaneous steel recently on inquiry was divided evenly between Jones & Laughlin Steel Corp., Pittsburgh, Youngstown Sheet & Tube Co., Youngstown, O., Wheeling Steel Corp., Wheeling, W. Va., Bethlehem Steel Co., Bethlehem, Pa., and Carnegie Steel Co., Pittsburgh. The entire requirements of steel wheels were awarded the latter.

The Pennsylvania will open bids Dec. 20 on a tonnage of wheels, piston heads, steel pipe, boiler tubes and pig iron. Norfolk & Western will open bids Dec. 22 on its quarterly requirements of 2500 tons of plates, shapes and bars and also on pipe. Atlantic Coast Line is in the market for plates, shapes and bars.

Receipt of a $1,300,000 order for air brake equipment has been announced by the New York Air Brake Co., Watertown, N. Y. Reported to be the largest order received by the company in four years, the equipment will be used on 8000 new freight cars for Chesapeake & Ohio, Nickel Plate and Erie railroads.

Public works administration has allotted $6,000,000 to the Boston & Maine and the Central of Georgia of which $500,000 to the latter is for the purchase of 200 new coal cars and $5,500,000 to the Boston & Maine is for reconditioning and for new equipment.

Rail Orders Placed

City of Detroit, 2700 tons, street rail, to Bethlehem Steel Co., Bethlehem, Pa.

Clinchfield, 500 tons 100-pound rail, to Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.; 2000 tons will be placed later.

Western Maryland, 2000 tons 90-pound rail and 4800 pairs of rail joints, reported placed with Carnegie Steel Co., Pittsburgh.

Car Orders Pending

Erie, 3775 freight cars and 133 miscellaneous coaches; specifications out.

Lehigh & New England, 500 cars, including 250 steel box, 150 50-ton steel hopper cars and 100 50-ton composite gondolas.

Rail Orders Pending

Missouri Pacific, 25,000 tons rail and fastenings; pending.

Western Pacific, 20,000 tons 85 and 112-pound rails, 6000 tons fastenings; taking bids.

Sheets

Sheet Prices, Page 42

Pittsburgh — Orders for sheets from several sources have improved. One buyer of electrical sheets closed on approximately 1000 tons last week. Cold-rolled sheets for autobodies have been in fair demand. Prices continue unchanged with the following Pittsburgh bases firm: 2.25c for black; 2.85c for galvanized; 1.75c for light plates; and 2.75c for light cold-rolled.

Cleveland—Sheet mills here operated last week at 50 per cent, while those in an adjacent lake district, serving largely the Michigan automotive industry, were running at 75 per cent. Although all material specified on fourth quarter contracts must be shipped by Dec. 31, sustaining operations, sheet producers expect fairly good demand in January. Automotive interests have not covered their fourth quarter requirements, but moderate tonnages have been placed for January delivery.

Chicago—Sheet specifications and shipments are declining slowly. With prices for first quarter unchanged from recent levels, buyers lack incentive to take larger tonnages than necessary at this time. First quarter contracting is slow.

Boston—Sheet buying in New England is limited to scattered carloads, with regular consumers covering for next quarter at unchanged prices. The New York, New Haven & Hartford railroad will require sheets for air-conditioning equipment.

Philadelphia — Contracting for sheets for first quarter is proceeding slowly, notwithstanding persistent rumors in some quarters of a general advance about the middle of January.

Cincinnati — A further improvement in demand from sheet mills in this district, sending production to 30 to 35 per cent, was due partly to heavier specifying for auto needs.

St. Louis—Sheet sales during the week developed a slight betterment. One stove manufacturer is reported to have taken a round tonnage, and inquiries have been received from refrigerator and radio makers.

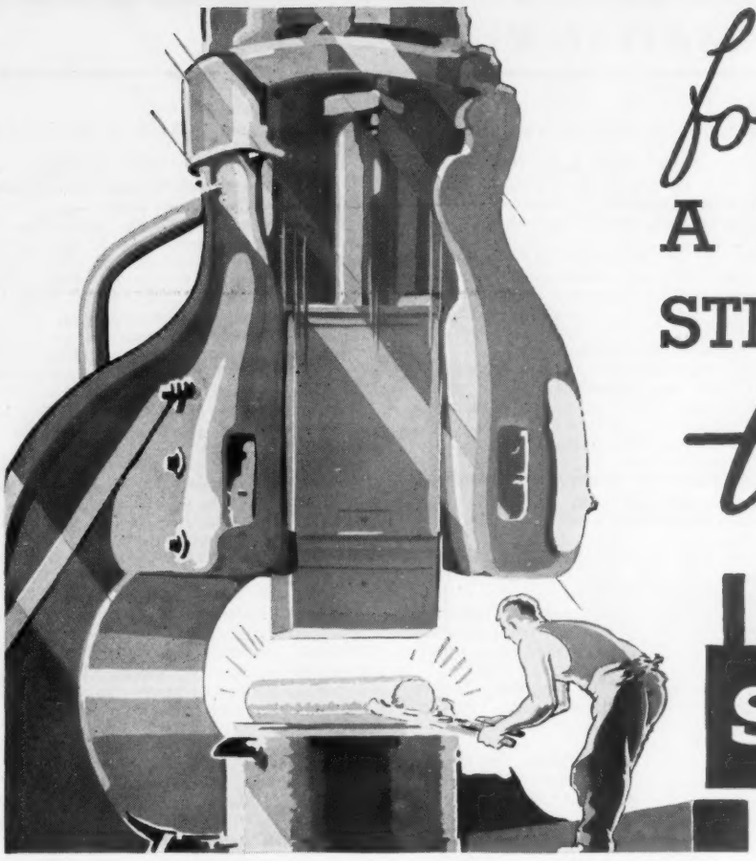
Bolts and Nuts

Bolt, Nut, Rivet Prices, Page 43

Prices on bolts, nuts and rivets have been reaffirmed for first quarter at 70 off list for bolts and nuts, 2.75c, base, Pittsburgh and Cleveland and 2.85c, Chicago, for large rivets. Small rivets have been extended into first quarter at 70 and 10 off list. Exception to the reaffirmation is an advance of about 10 per cent in stove bolts, hexagon and square-head cap screws, for first quarter.

Bolt and nut orders in December have been light during December at Pittsburgh, but railroad and automotive buying is relied on to give better volume soon.

November nut and bolt business at Cleveland was 10 per cent lower than that of October, and from present indications December volume will be under that of November. Producers are confident of improved demand next month.



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Shapes

Structural Shape Prices, Page 42

More than 12,000 tons of fabricated structural steel for 26 bridges in the New York Central grade elimination work at Syracuse, N. Y., was awarded last week to the American Bridge Co., Pittsburgh, through Walsh Construction Co., Syracuse, N. Y.

Another outstanding contract of the week was the award of 5000 tons by Mathieson Alkali Co. for buildings at Port Arthur, Tex.

Fabricators generally are looking to the public works program of the federal government to increase demand. The first of the more important projects pending at Philadelphia is a high-speed line over the Delaware river bridge, with specifications for the Philadelphia approach involving 1000 tons expected out in the next few days.

Orders for Mississippi river locks at Quincy, Ill., and Winona, Minn., constitute the larger portion of total bookings of 4500 tons for the week, reported at Chicago.

Among the relatively few private construction awards of the week is that of 860 tons for a warehouse for the Libbey-Owens-Ford Glass Co., Toledo, O.

New England structural shops have taken out little plain material during the closing quarter, but the outlook for early next year is much brighter. Numerous small lots for CWA projects, generally for quick delivery, are being booked.

Close to 1400 tons of steel piling has been purchased for Cape Cod canal bridge substructures.

Plain structural shapes remain quoted 1.70c, base, Pittsburgh, with no change for the first quarter. Steel piling also is unchanged at 2.00c, Pittsburgh.

Contracts Placed

12,000 tons, 26 bridges in grade elimination work, New York Central railroad, Syracuse, N. Y., to American Bridge Co., Pittsburgh; through Walsh Construction Co., Syracuse, N. Y.

5000 tons, fertilizer buildings for Mathieson Alkali Co., Port Arthur, Tex., to Virginia Bridge & Iron Co., Roanoke, Va.

4000 tons, federal building, San Francisco, to McClintic-Marshall Corp., Bethlehem, Pa.; through Great Lakes Construction Co., Chicago.

2500 tons, piling, lock No. 5, Quincy, Ill., to Inland Steel Co., Chicago.

1500 tons, tunnel lining, San Francisco-Oakland bridge, San Francisco; contract No. 5, Yerba Buena island, to Columbia Steel Corp., San Francisco.

1200 tons, plant for Santa Cruz Portland Cement Co., Davenport, Calif., to Columbia Steel Corp., San Francisco.

1000 tons, lock No. 5-A, Winona, Minn., to Milwaukee Bridge Co., Milwaukee; McCarthy Improvement Co., Davenport, Iowa, general contractor.

1000 tons, piling, substructures (cofferdam), two highway bridges, Cape Cod canal, Bourne-Sagamore, Mass., to Kalman Steel Corp., Bethlehem, Pa.; P. J. Carlin Construction Co., New York, general contractor.

860 tons, warehouse, Libbey-Owens-Ford Glass Co., Toledo, O.; 425 tons for building to McClintic-Marshall Corp., Bethlehem, Pa.; 435 tons for racks to Lackawanna Steel Construction Corp., Buffalo.

550 tons, plant for American Potash & Chemical Co., Loving, N. Mex., to Virginia Bridge & Iron Co., Roanoke, Va.

500 tons, cranes for San Francisco-Oakland bridge, San Francisco, to unnamed interests.

500 tons, shapes and plates, wharf boat, Greenville, Miss., to Ingalls Iron Works Co., Birmingham, Ala.

435 tons, double hangar, Maxwell Field, Alabama, to Ingalls Iron Works Co., Birmingham, Ala.; Algernon Blair, Montgomery, Ala., general contractor.

400 tons, piling, substructure, railroad lift bridge, Cape Cod canal, Buzzards Bay, Mass., to Kalman Steel Corp., Bethlehem, Pa.; C. W. Blakeslee & Sons Inc., New Haven, Conn., and Blakeslee-Rollins Corp., Boston, general contractors.

380 tons, ordnance magazine, Fort Sill, Oklahoma, to J. B. Klein Iron & Foundry Co., Oklahoma City; Henger Construction Co., Dallas, Tex., general contractor.

375 tons, extension to plant for Babcock & Wilcox Co., Boulder dam, Boulder City, Nev., to Consolidated Steel Corp., Los Angeles.

370 tons, foundry extension, Pearl Harbor, T. H., to Virginia Bridge & Iron Co., Roanoke, Va.

350 tons, building, for A. Wilhelm Paint Co., Reading, Pa., plain material to be furnished by the Bethlehem Steel Co., Bethlehem, Pa., and the Phoenix Iron Co., Phoenixville, Pa., to the Reading Steel Products Co., Reading, Pa., noted in a previous issue as having been awarded the fabrication contract.

350 tons, shapes and bars, stables, quarters and shops, Fort Bragg, North Carolina, shapes to Carolina Steel & Iron Co., Greensboro, N. C. Bars to Maryland Steel Products Co., Baltimore; Reinecke Dixon Construction Co., Fayetteville, N. C., general contractor.

305 tons, bridges, NRS 570-B & D, Osage county, Kansas, to Kansas City Structural Steel Co., Kansas City, Mo.

290 tons, factory building, Paulsboro, N. J., to American Bridge Co., Pittsburgh.

250 tons, lookout towers, department of agriculture, schedule 5301-37, to Aermotor Corp., Chicago.

230 tons, bridge, Coleman and McCulloch counties, Texas, to Petroleum Iron Works, Beaumont, Tex.; Jensen Construction Co., Austin, Tex., general contractor. Southern States Steel Corp., Dallas, awarded 72 tons of reinforcing steel.

225 tons, bridge, Livingston, Mont., to Wisconsin Bridge & Iron Co., Milwaukee.

200 tons, state bridge, Gardenville, N. Y., to Lackawanna Steel Construction Corp., Buffalo.

200 tons, building for E. I. Dupont de Nemours, Carney's Point, Pa., to McClintic-Marshall Corp., Bethlehem, Pa.

190 tons, factory building, Manville, N. J., to Belmont Iron Works, Philadelphia.

140 tons, sludge tanks for southerly sewage plant, Cleveland, to T. H. Brooks & Co., Cleveland; through Hunkin-Conkey Construction Co., Cleveland.

130 tons, postoffice addition, Schenectady, N. Y., to Bethlehem Fabricators Inc., Bethlehem, N. Y.; Murch Bros., St. Louis, general contractors. Sweets Steel Co., Williamsport, Pa., awarded reinforcing bars.

125 tons, building, Leavenworth, Kans., to Gate City Iron Works, Omaha, Nebr.

125 tons, highway bridge, Minnesota, to American Bridge Co., Pittsburgh.

110 tons, children's building, hospital, Holstville, Long Island, N. Y., to George A. Just Co., Brooklyn.

110 tons, St. Agnes' church, Rockville Center, N. Y., to August Bellon Inc., Brooklyn.

100 tons, building, Appleton, Wis., to Vulcan Mfg. Co., Fond du Lac, Wis.

100 tons, bridge, North River, Scituate-Marshfield, Mass., to Boston Structural Co., Boston.

Shape Awards Compared

	Tons
Week ended Dec. 16	35,170
Week ended Dec. 9	12,568
Week ended Dec. 2	31,070
This week in 1932	12,174
Weekly average for 1932	17,429
Weekly average, 1933	15,098
Weekly average, Nov.	16,020
Total to date, 1932	835,684
Total to date, 1933	770,011

Contracts Pending

4000 tons, roller crest dam, Mongomery island, Ohio river, near Pittsburgh; Booth & Flinn Co., Pittsburgh, low on general contract, at $2,461,697 for roller crest type and at $2,436,565 for direct lift type; bids Dec. 12.

1500 tons, shapes and plates, easterly sewage disposal plant, Cleveland; general contract awarded to Hunkin-Conkey Construction Co., Cleveland.

1135 tons, specification 63, metropolitan water district, Los Angeles; Youngstown Steel Car Corp., Niles, O., low.

900 tons, plate girder span, East Aurora, N. Y., for Pennsylvania railroad; Ferguson-Edmundson Co., Pittsburgh, low on general contract.

750 tons, sheet steel piling for state in Ventura county, California; Basich Bros., Torrance, Calif., low.

650 tons, state hospital buildings, Mattapan district, Boston.

500 tons, municipal building, Pawtucket, R. I.; bids Dec. 19.

500 tons, state hospital addition, Sonyea, N. Y.; bids in.

400 tons, superstructure, pier No. 1, Fort Mason, Calif.; bids Dec. 12.

340 tons, extension to pier No. 3, Fort Mason, Calif.; general contract to Healy-Tibbitts Co., San Francisco.

300 tons, state hospital addition, Albion, N. Y.; bids Dec. 21.

277 tons, state bridge over Eel river, Mendocino county, California; bids Dec. 27.
265 tons, piling, city of Chicago; Carnegie Steel Co., Pittsburgh, recommended for award.
250 tons, highway bridge, Oklahoma.
200 tons, building, Bardstown, Ky.
188 tons, machine shop and garage, Barksdale Field, Shreveport, La.; Worsham Bros., Knoxville, Tenn., general contractor.
179 tons, state bridge over Santa Ana river, Orange county, Calif.; Franklin B. Gridley, Pasadena, Calif., low bidder.
175 tons, bridge, Santa Ana, Calif.
175 tons, underpass, Grand Prairie, Tex.
175 tons, cranes, Mare Island, Calif.
173 tons, bridge to carry route 29 across South branch, Raritan river, Hunterdon county, New Jersey; bids Dec. 28. Project takes 32 tons of reinforcing bars.
115 tons, school, Warwick, R. I.
113 tons, bridge to carry route 6, section 1-F across route 2 North, Hasbrouck Heights, N. J.; bids Jan. 2. Project also takes 76 tons of bars.
108 tons, piling for pier, quay walls and repair basin, Pearl Harbor, T. H.; general contract to Hawaiian Dredging Co., Honolulu.
100 tons, piling, Ventura county, California, for state; general contract to Silveria & Robbins, Ventura, Calif.
100 tons, piling, shoe protection, lighthouse bureau, Cohasset, Mass.
100 tons, shapes and bars, bridge to carry Lake Hopatcong road across route 10, Morris county, New Jersey; bids Dec. 28.

Reinforcing

Reinforcing Bar Prices, Page 43

An award of 6500 tons of reinforcing bars for government work at Pearl Harbor, T. H., is the largest in the market for the week. Public works projects throughout the United States which require substantial tonnages are maturing slowly.

The Ohio state highway commission is taking bids on four 250-ton lots of concrete bars for CWA projects. In Cleveland, the general contract for the easterly sewage disposal plant has been awarded, this project requiring 2500 tons of bars, and approximately 1200 tons of shapes and plates.

About 1000 tons have been placed for Illinois state bridge and highway construction. Bids have been closed on additional projects of this nature and orders are expected to be distributed soon, although a large portion of such work will be deferred until spring. Several Mississippi river locks are pending and others are in prospect, the total involving several thousand tons of bars.

New York and New Jersey state highway departments purchased close to 1000 tons of mesh and rerolled steel.

The base price on cut lengths of new billet steel bars remains 1.90c, Pittsburgh, with rail steel bars 1.75c, Pittsburgh.

Contracts Placed

6500 tons, pier, quay walls and repair basin, Pearl Harbor, T. H., to Pacific Coast Steel Corp., San Francisco.

Concrete Awards Compared

	Tons
Week ended Dec. 16	12,137
Week ended Dec. 9	2,843
Week ended Dec. 2	5,130
This week in 1932	3,170
Weekly average for 1932	3,920
Weekly average, 1933	3,721
Weekly average, Nov.	3,253
Total to date, 1932	204,075
Total to date, 1933	189,768

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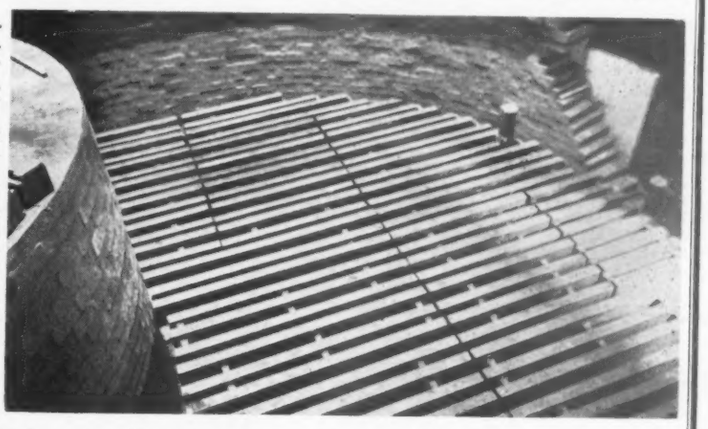
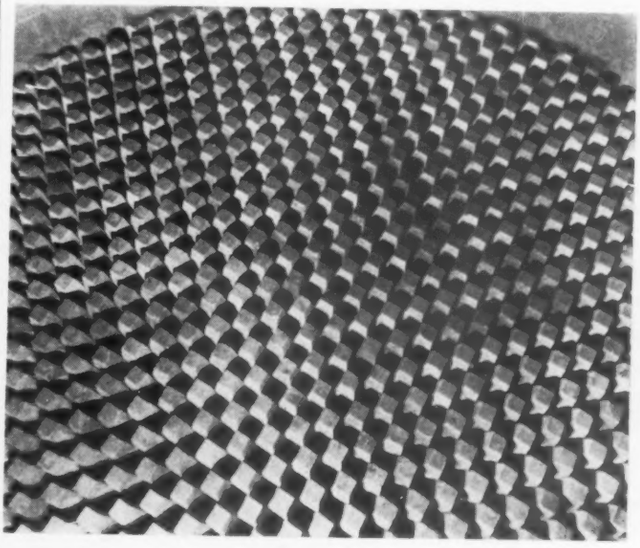


The Checkers are supported by our AMERICAN STEEL BOTTOM as shown. They rest on grids fabricated from heavy steel slabs which in turn are supported by 3" x 9" slabs resting on heavy "H" columns. Angles are welded to columns to form a saddle in which the 9" slabs rest. Column is protected from abrasion by a slip-on cover made of one-half inch plate. The entire structure is so designed that each and every member is free to expand or contract without interfering with any other member.

Illustration of Inlet Checkers, or the top course of checkers in the chamber.



This Inlet Checker Design produces a free area of approximately 70%, thus permitting easy entry of the gases into all flues. This Design guarantees sufficient brick volume to withstand the high temperature and turbulence of the gases as they enter the checker chamber.

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1025 tons, Illinois state bridge and road work, divided among Concrete Engineering Co., Truscon Steel Co., Inland Steel Co., and Material Service Corp., Chicago.

460 tons, highway, route 2, section 7, from route 4 (Paramus) to Wearimus road, Bergen county, New Jersey, to Truscon Steel Co., Youngstown, O.; George M. Brewster & Son Inc., Bogota, N. J., general contractor.

420 tons, school, Wilmington, Del., to Kalman Steel Corp., Bethlehem, Pa.; through Karno Smith Co.

400 tons, lock No. 6, Mississippi river, near Trempealeau, Wis., to Paper, Calmenson & Co., St. Paul; previously reported to another interest.

400 tons, addition to building, Neighbors of Woodcraft, Riverside, Calif., to unnamed interest.

375 tons, substructures, state bridges, East Boston-Revere, Mass., to Northern Steel Co., Boston; through Morris & Stevens, subcontractors; A. Baruffaldi, general contractor.

325 tons, highway, route 10, section 6, Succasunna to Lake Hopatcong road, Morris county, New Jersey, to Igoe Bros., Newark; Gray Construction Co., Morristown, N. J., general contractor.

300 tons, highway, Pompey-Cazenovia, points 1 and 2, Madison and Onondaga counties, New York, to Kalman Steel Corp., Bethlehem, Pa.; William P. MacDonald Construction Co., New York city, general contractor.

290 tons, highways, Fort Sam Houston, Texas, divided: 190 tons of bars and mesh to Sheffield Steel Corp., Kansas City, Mo.; 100 tons of mesh to Pittsburgh Steel Co., Pittsburgh. Truscon Steel Co., Youngstown, O., awarded 23,500 linear feet of metal center strip. R. W. Briggs & Co., Pharr, Tex., general contractor.

250 tons, state bridges, Bexar-Comal counties, Texas, to Alamo Iron Works, San Antonio, Tex.; Buchanan Construction Co., Temple, Tex., general contractor.

250 tons, bars and shapes, bridge and overpass, Sutton and Lanpasas counties, Texas, bars to Alamo Iron Works, San Antonio; shapes to Houston Structural Steel Co.; cylinder and cutting edges to Wyatt Metal & Boiler Works; W. W. Vann & Co., Mercedes, Tex., general contractor.

245 tons, state highway, two sections, Hillsboro county, New Hampshire, to Wickwire-Spencer Steel Co.; general contractors B. Perini & Sons Inc., Framingham, Mass., and Amos D. Bridges' Sons Inc., Hazardville, Conn.

237 tons, including 93 tons of mesh, Emmett-Prescott road, Nevada county, Arkansas, to Truscon Steel Co., Youngstown, O.; A. C. Campbell Construction Co., Shreveport, La., general contractor. Same fabricator awarded 33,264 feet of metal center strip.

230 tons, highway, East Boston-Revere, Mass., state bridge approaches, and North river bridge, Scituate-Marshfield, Mass., to Concrete Steel Co., Boston; contractors, A. G. Tomasello & Son, Inc., Boston, for former, and Lee Construction Co., Boston, for latter. Also technical high school, Springfield, Mass.; E. J. Pinney, Inc., general contractor.

220 tons, highway, Hunterdon county, New Jersey, to Truscon Steel Co., Youngstown, O.; through Riverside Contracting Co.

145 tons, substructure, railroad lift bridge, Cape Cod canal, Buzzards Bay, Mass., to Kalman Steel Corp., Bethlehem, Pa.; C. W. Blakeslee & Sons Inc., New Haven, Conn., and Blakeslee-Rollins Corp., Boston, general contractors.

133 tons, metropolitan water district, Los Angeles, to Soule Steel Co., Los Angeles.

132 tons, specification 17705, metropolitan water district, Los Angeles, to unnamed interest.

100 tons, building for Los Angeles County Medical association, Los Angeles, to unnamed interests.

100 tons, ordnance magazine, Fort Sill, Oklahoma, to J. B. Klein Iron & Foundry Co., Oklahoma City; Henger Construction Co., Dallas, Tex., general contractor.

Contracts Pending

2500 tons, easterly sewage disposal plant, Cleveland; general contract awarded to Hunkin-Conkey Construction Co., Cleveland.

1000 tons, CWA projects in Ohio; state highway commission, Columbus, taking bids on four 250-ton lots.

916 tons, Boulder dam, Boulder City, Nev., specification 23022-A; Soule Steel Co., Los Angeles, low.

400 tons, Standard Brands of California building, Oakland, Calif.

250 tons, storehouse extension, Pearl Harbor, T. H.; E. E. Black, Ltd., Honolulu, low.

200 tons, magazines, Mare Island, Calif.; general contract to Carl N. Swenson, San Jose, Calif.

115 tons, Henrotin hospital, Chicago.

115 tons, monastery, Jamaica Plain section, Boston.

Unstated tonnage, normal school for Eau Claire, Wis., to cost $243,000; PWA agreed to finance construction.

Unstated tonnage, $650,000 tuberculosis pavilion for Toledo, O.; city to apply for PWA loan.

Unstated tonnage, grain elevator and dock for Kansas City, Kans.; city applied to state for loan and grant of $1,700,000.

Unstated tonnage, Veterans' hospital, Roanoke, Va.; Algernon Blair, Montgomery, Ala., awarded general contract; some structurals also required.

Pipe

Pipe Prices, Page 43

Cast iron pipe buying in New England is the heaviest in months, largely the result of approved government loans for municipal watermain extensions.

Demand in the New York district is lagging behind inquiry in other eastern sections, however, although several municipalities are expected to close soon on substantial tonnages.

The market on tubular products at Pittsburgh continues slack and general demand for standard pipe is not improved. Seamless and mechanical tubing for automotive use is not yet in good demand. Booth & Flinn Co., Pittsburgh, will require 36,222 feet of various sizes of steel pipe in connection with construction work on the roller crest dam at Montgomery island in the Ohio river.

Orders for small miscellaneous lots of cast iron pipe in the Chicago territory are more numerous, although the placing of larger tonnages still is slow.

Slightly better activity is reported in the cast iron pressure pipe plants in the Birmingham, Ala., district.

Cast Pipe Placed

1060 tons, 16-inch, classes A, C and D, Mt. Airy and Paddock road projects, Cincinnati, to United States Pipe & Foundry Co., Burlington, N. J.; Crumley, Jones & Crumley Co., Cincinnati, general contractors.

1000 tons, 24-inch, Worcester, Mass., to R. D. Wood & Co., Florence, N. J.

800 tons, Latham water district, Colonie, N. Y., divided, to Central Pipe & Foundry Co. and United States Pipe & Foundry Co., Burlington, N. J.; Solomon & Keis, Troy, N. Y., engineers.

800 tons, 6 to 12-inch, Paxton, Mass., to Central Pipe & Foundry Co.

500 tons, 16-inch, Melrose, Mass., to Warren Foundry & Pipe Co., Phillipsburg, N. J.

450 tons, Waltham, Mass., to R. D. Wood & Co., Florence, N. J.

300 tons, Shrewsbury, Mass., to R. D. Wood & Co., Florence, N. J.

150 tons, mostly 12-inch, Middleboro, Mass., to Warren Foundry & Pipe Co., Phillipsburg, N. J.; town will buy 150 tons more shortly.

150 tons, 10 and 12-inch, Lexington, Mass., to Warren Foundry & Pipe Co., Phillipsburg, N. J.

120 tons, 8-inch, class 150, Redwood City, Calif., to American Cast Iron Pipe Co., Birmingham, Ala.

Steel Pipe Placed

150 tons, 500 sections, small sizes, United States engineer, New Orleans, to Kane Boiler Works, Galveston, Tex.

Unstated tonnage, 140 sections, 18-inch welded shore pipe, United States engineer, Memphis, Tenn., to Virginia Bridge & Iron Co., Roanoke, Va.

Cast Pipe Pending

1850 tons, Springfield, Ill.; bids postponed to Jan. 8.

740 tons, 10 and 14-inch, class 150, Santa Cruz, Calif.; bids in.

500 tons, estimated, 24-inch, New Bedford, Mass.

450 tons, various sizes, South Bend, Ind.

300 tons, various sizes, Sandusky, O.

250 tons, Chicopee, Mass.; Warren Foundry & Pipe Co., Phillipsburg, N. J., low on 10 and 12-inch, also fittings; R. D. Wood & Co. low on 20-inch, both truck delivery.

194 tons, 20-inch, class 150, Alhambra, Calif.; bids Dec. 19.

Wire

Wire Prices, Page 43

New minimum prices on various wire products, based on Anderson, Ind., have been filed with the American Iron and Steel institute, effective

Dec. 23. These prices conform to higher prices at other basing points, filed earlier in the month. The new prices are: Drawn and weaving wire, not for fly screen cloth, 4.04c; bessemer or basic manufacturers wire, 2.25c; annealed fence wire, 2.40c; galvanized fence wire, 2.75c; extra galvanized core wire, 4.05c; extra galvanized armor wire, 3.40c; polished staples, 3.10c; galvanized fence staples, 3.35c; galvanized netting staples, 4.50c; barbed wire, 2.90c; at Chicago, minimum for high-carbon spring wire has been made 3.25c, effective Dec. 23.

Specifications and shipments of wire and wire products are heavy, closing fourth-quarter contracts. On new business the advanced schedule of prices is quoted uniformly.

Copperweld Steel Co., Glassport, Pa., has received a contract to supply 100,000 feet of three-strand copper-coated wire for Mississippi river revetement work. Material will be inspected by the New Orleans engineers.

Cleveland wiremakers find first-quarter contracting slow, though many have covered under the flexible contract form, allowing cancellation each month.

Movement of wire products to agricultural areas from Chicago is light and automotive needs are not heavy. Shipments generally are at a high rate to close current contracts.

New England consumers are buying close to requirements and covering for first quarter.

Wire users in the New York territory are specifying briskly under urge of higher prices on first quarter material.

Strip Steel

Strip Prices, Page 43

The strip steel market has shown slight improvement from week to week through December and although much of present ordering is for shipment before the end of this year there is some interest on the part of large buyers in placing orders for shipment after Jan. 1. Manufacturers of shovels, crosscut and handsaws have been buying strip, both hot and cold-rolled. Generally speaking, the automotive trade is not in the market. Prices are firm and are based uniformly on 1.75c, Pittsburgh, for hot-rolled strip steel and 2.40c, Pittsburgh or Cleveland, for cold-rolled strip.

Stripmakers at Chicago see some improvement in automotive buying but large orders from this source are not expected until January. Some covering for first quarter is being done.

Somewhat better demand for strip from radio manufacturers is the only improved factor in Eastern Pennsylvania and first quarter contracting is proceeding slowly.

There is a stronger tendency at Cleveland to cover requirements for first quarter, and some contracts have been closed. Spot orders also are more numerous.

Cold strip volume reaching New England mills is light. Unchanged prices at 2.60c, Worcester, Mass., for first quarter furnish no incentive to early covering, most regular consumers still having fairly large stocks. Hot-rolled strip is also dull.

Tin Plate

Tin Plate Prices, Page 42

Pittsburgh—Although reductions in tin plate rolling schedules are in prospect, the average last week was approximately 90 per cent. Tin plate producers are endeavoring to complete shipments on tin plate contracts before Dec. 31. Stock tin plate to consumers at 4.55c, Pittsburgh, and to jobbers at 4.25c, Pittsburgh, is incorporating the advance recently filed with steel code administration authorities. Tin mill black sheets at 2.65c, and No. 24 long ternes at 3.25c are firm and unchanged. A few contracts for tin plate have been closed at $5.25.

Cold Finished

Cold Finished Prices, Page 43

Pittsburgh—Through last week, cold-finished steel bar orders were still being placed with the stipulation that shipments be completed by Dec. 31. However, beginning with this week, producers will likely be unable to promise delivery dates before the first of the year on new business. Therefore, while bookings of cold-finished steel bars will decline over the balance of December, shipments will increase. Included in recent buying have been orders of several automobile parts manufacturers. Until the $3 a ton advance becomes effective on Jan. 1, cold-finished steel bars remain based on 1.95c, Pittsburgh, 2.00c, Cleveland, Buffalo or Chicago, 2.15c, Detroit, and 2.20c, Eastern Michigan.

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Pig Iron

Pig Iron Prices, Page 44

Pittsburgh—Foundry iron market is quieter, with orders being confined to single carload lots. Base of $18 Neville Island, is quoted on foundry grades with basic still more or less nominal at $17.50. Merchant furnace activity still is mainly on the completion of old orders and new buying has fallen to insignificant proportions.

Cleveland—Inquiries are more numerous and some contracts for 500 to 1000 tons have been placed for January and February delivery. Few of the larger consumers, however, have come into the market for that period. Heavy shipments on fourth quarter contracts, which for December are nearly double the November tonnage, are expected to keep the majority of melters supplied for some time after the first of the year. The base price is steady at $17.50, Cleveland, and nearby lake furnaces.

Chicago—New business continues to increase and tonnages booked so far this month are moderately ahead of expectations. The carryover of iron in stocks of some consumers, it had been thought, would acccommodate first quarter requirements, but in a number of instances buyers have improved operations in prospect and are seeking protection at unchanged prices. Possibility of a further advance in quotations is an additional incentive to contract ahead. Shipments so far in December are 15 to 20 per cent heavier than in November, and although foundry operations are tending upward, code provisions are important in bolstering deliveries. The market continues $17.50, furnace, for No. 2 foundry and malleable.

Boston—Shipments against expiring fourth-quarter contracts are active and the smaller users will generally be well stocked for early 1934 at least. Buyers have taken in considerable of this iron below the recent advances, but after Jan. 1 new prices apply. A large tonnage of Dutch iron recently arrived at Providence, R. I., part of which was sold before arrival.

New York—While little new contracting is being done, shipments on old contracts continue ahead of last month.

Philadelphia—While there is little forward buying, shipments of pig iron against expiring contracts have increased substantially. Recent buying includes some foundry iron for the Baldwin Locomotive Works. Pennsylvania railroad opens bids Dec. 20 on a moderate tonnage.

Buffalo—Shipments are reversing the usual sharp seasonal decline and are fully up to the November total. Foundry operations after Jan. 1 are expected to show substantial gain over the last 60 days of this year. Five furnaces now producing iron in this district will continue active into the new year. Code prices are being maintained firmly.

Cincinnati—Buying was accelerated the past week. Total bookings were near 1500 tons. Basic and southern iron are in light demand. More iron will be moved this month than in November.

St. Louis—Relatively light buying continues, although shipments are heavy on contracts expiring at the end of the month. Sentiment is steadily more optimistic and purchasing on a liberal scale is looked for after the first of the year. Stove plants have continued active unusually late in the season, with a heavy volume of business being received from the South, where plow-up money, 10-cent cotton and profitable tobacco and rice prices have added substantially to purchasing power.

Birmingham, Ala.—Shipments are somewhat heavier although little improvement in new business has been felt. Production of basic iron has been increased, but the melt is absorbing it. Unchanged prices for first quarter have not yet proved much of a stimulus to new business.

Toronto, Ont.—Merchant sales showed some improvement during the week, due to the fact that several melters were in need of supplies for immediate use rather than any direct step up in the daily melt. Current demand is mostly in single car lots. Prices are firm and unchanged.

Coke

Coke Prices, Page 43

Inquiry for six months' supply of furnace coke by a large blast furnace operator in the Pittsburgh district is now being figured. This furnace will use around 15,000 tons of furnace coke per month so that the inquiry, while worded for the furnace's needs until July 1, 1934, may result in shipment over first half of as much as 90,000 tons.

Otherwise, the coke market is weak and declining. The foundry melt in the Pittsburgh district is decidedly small this month and while coke sellers are able to get the full code prices there has actually been little test.

By-product coke movement at Chicago is moderately heavier than a month ago as foundries increase production. Prices are steady at the former level.

Some carlots of coke are being bought at St. Louis but most users are well covered by contract and have large reserves. Domestic grades are active.

Birmingham, Ala., coke shipments are increasing slightly as users enlarge operations and coke ovens have been lighted to meet demand.

Iron Ore

Iron Ore Prices, Page 44

Cleveland—Dock balances of iron ore at Lake Erie ports Dec. 1 were only 214,577 tons more than on the comparable date last year, though receipts for the season were 13,589,850 tons larger than those for 1932. The Lake Superior Iron Ore association reports receipts, shipments and dock balances for the season to Dec. 1 as follows:

Port	Receipts	Shipments	Dock Bal. Dec. 1, '33
Buffalo	1,544,526	4,270	1,898
Erie	777,717	794,697	121,163
Conneaut...	2,789,133	2,574,576	1,904,806
Ashtabula	2,066,817	1,986,526	1,625,410
Fairport....	1,087,352	1,110,722	387,735
Cleveland..	4,597,544	3,227,143	972,192
Lorain	2,029,469	1,257,087	12,931
Huron	514,789	472,810	365,585
Toledo	890,051	482,756	13,971
Total.....	16,297,398	11,910,587	5,405,691
Year ago...	2,707,548	2,478,190	5,191,114

Receipts at other lake ports follow:

Port	Tons
Detroit	554,375
Indiana Harbor	1,015,417
Gary	1,369,505
South Chicago, local fces.....	2,005,788
Hamilton, Ont.	123,870
Total	5,068,955
Comparative, one year ago.....	824,759

New York—Two cargoes of Australian manganiferous ore, about 8000 tons, have been placed recently by an eastern Pennsylvania consumer. Recent arrival of approximately 7600 tons of iron ore from Morocco is for an eastern Pennsylvania consumer and brings deliveries against his contract for 40,000 tons up to more than 20,000 tons. Another cargo of iron ore from Africa, about 6000 tons is said to be for the account of another eastern Pennsylvania consumer.

Scrap

Scrap Prices, Page 45

Pittsburgh — Marking a second week of rapid and successive advances, No. 1 heavy melting steel in this district has, in seven days, risen 75 cents a ton to be quoted at $12.50 to $13. On the basis of several purchases at this level last week, more consuming interest by mills was evident. The cast scrap market has advanced 50 cents in view of a fairly large purchase of heavy breakable at $11 to $11.50. The remainder of the scrap list has been affected appreciably by the market strength, which is permeating not only specialties but low phos material, machine shop turnings, and scrap rails.

Cleveland — Purchase of some heavy melting steel, busheling and mixed turnings, divided among a number of dealers, for January delivery, is the only activity here. One consumer at Youngstown, O., is taking in some material on contract. Prices are at the published level.

Chicago — Scrap prices continue strong in the face of light buying by steel mills. Sales of heavy melting steel have been limited to small lots, but prices bid by sellers in covering old orders are higher. Some dealers who recently were picking up heavy melting steel at $8 now are bidding $9 and find little tonnage available.

Boston — Demand for scrap continues sluggish with New England melters taking few shipments. Prices, while steadier, display little additional strength. The New England pipe foundry has a heavy backlog and is taking some cast scrap.

New York—Scrap prices are steadier, reflecting firmness in other districts, although shipments are light. Heavy melting steel grades for barge loading are unchanged.

Philadelphia — Scrap prices continue stronger, with heavy melting steel now holding at $10 to $10.50, delivered, blast furnace borings and turnings, $5.50 to $6; cast wheels, $11 to $11.50; and rolled steel wheels, $13. Only in the case of railroad malleable has there been a reduction, this grade being sold recently as low as $11.50, delivered. Strength in No. 1 steel is reflected in higher dealers' buying prices. Some buying has been done recently by dealers at the equivalent of $10.50, delivered, and it appears that if a consumer were to enter the market for a round tonnage at this time he might have to pay as high as $11.

Buffalo—A substantial tonnage of blast furnace scrap has been sold for local delivery at $6.50 to $7 or above, according to dealers. There is a much better prospect for sales of heavy melting steel than for some time. The market is nominally much stronger here although confirming sales are lacking in most materials.

Detroit — Iron and steel scrap prices are unchanged at the level of $7 to $7.50 for No. 1 heavy melting steel and hydraulic compressed sheets, but the market shows increased signs of strength. Only the fact that the local mill remains out of the market has prevented a rise of $1 or more per ton. Dealers look for an increase in quotations before the end of the year. And a strong situation for spring appears to be shaping up.

Cincinnati—Mills continue out of the market for iron and steel scrap. Quotations are nominally unchanged, although showing increasing strength on influence from other districts.

St. Louis—Iron and steel scrap exhibits greater activity and strength than for several weeks, with sentiment favoring still further advances. Three of the principal east side mills have purchased round tonnages, reported total of which is 18,000 to 22,000 tons.

Birmingham, Ala. — While pipe shops are buying a little heavy melting steel and some cast scrap, the market generally is quiet. Heavy melting steel is quoted around $9.

Toronto, Ont.—Demand for iron and steel scrap continues specialized and spotty. Steel grades are dull with only occasional small sales. Foundries maintain fair demand for iron grades. Dealers are out of the market except for special grades, such as cast scrap and stove plate.

Semifinished Steel

Semifinished Prices, Page 43

Semifinished steel orders are declining as the year closes. The $26, Pittsburgh base on sheet bars and billets is firm, and all new orders for wire grades are quoted $36, Pittsburgh. Tin plate producers who take a large tonnage of sheet bars are expecting to cut down their rolling schedules. Skelp at 1.60c, Pittsburgh, has been tested by a few sales to non-integrated pipe manufacturers there.

Indian Iron & Steel Co. Ltd., Calcutta, produced 63,303 tons in the third quarter.

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Warehouse

Warehouse Prices, Page 46

Warehouse business at Detroit is proceeding at the November level and thus far the seasonal recession is not apparent. The last week of the month, however, may be quiet, owing to the holidays. Prices are steady.

Following a general advance last week, warehouse prices at Baltimore are steady with buying so far this month above the November rate.

A slight improvement in warehouse trading at Philadelphia is expected to continue through this week, with a general let down to follow over the holiday period.

Warehouse volume in New England holds fairly steady with demand well spread and prices unchanged. Jobbers are benefiting by demand for quick delivery for miscellaneous steel for public work needs under the emergency program.

Although soft steel bars are subject to some shading at 3.00c out of warehuse in the Houston, Tex., district, plates and shapes are firmly quoted at 3.00c, same basis. Bands are quoted 3.25c; 10 gage hot-rolled annealed sheets 3.60c; and galvanized sheets, No. 24 gage flat, 5.05c.

Seasonal influences are being felt in warehouse business at St. Louis, volume having shown slightly downward trends since the last of November.

Sales of steel from Cincinnati warehouses are showing resistance to seasonal downtrend, miscellaneous industrial demand accounting for most of the tonnage.

Prices on warehouse products at New York are steady but orders are less than a month ago. Warehouses indicate they will advance the price of cold-drawn bars out of stock, probably around Jan. 1.

Prices continue from day to day on warehouse hot-rolled steel items at Pittsburgh and it is likely that bars at 3.05c, and plates and shapes at 2.85c, Pittsburgh warehouse, will continue through January, at least. Bolts and nuts at 65 off list and large rivets at $3.25 per 100 pounds continue unchanged at Pittsburgh.

Sales have improved slightly at Chicago, following the Thanksgiving holiday and although lighter than in November, the decrease is less than seasonal.

Demand for steel from warehouse at Cleveland also improved slightly during the week.

Metals

Nonferrous Metal Prices, Page 44, 45

New York—Renewed strength in copper was outstanding in the metal market last week. Little change pricewise developed in the other metals and demand, except for copper and lead, was quiet.

Copper—Following several weeks of inactivity, consumers showed more interest and custom smelters advanced their prices ¼-cent. Business was done into second quarter of 1934. Favorable outlook for agreement on a code and advances in the metal abroad were supporting factors. New base prices on rolled products were issued.

Lead—Buying was more active with the bulk for January shipment. Battery makers and sheet and pipe producers were heaviest buyers. Prices were steady.

Zinc—Bulk of the business went at 4.50c, East St. Louis, but some also was done at concessions of about $1 a ton.

Tin—Prices were guided largely by fluctuations in sterling which was higher as the week closed. Consumers are deferring buying until after inventory-taking.

Antimony—Prices eased near the close of the week. Demand was negligible.

Ferroalloys

Ferroalloy Prices, Page 44

Although an announcement affecting the first quarter price is expected momentarily, the price of ferromanganese continues $82, duty paid, seaboard, or $87.24, delivered Pittsburgh. An eastern Pennsylvania ferromanganese producer, which has been supplying a large part of the merchant trade in the East on ferromanganese, suffered an interruption in its production schedule last week when mechanical difficulties at its blast furnace caused temporary suspension.

Frank Samuel, *President* — **S. A. Cochran**, *Vice Pres.* — **Snowden Samuel**, *Sec'y. Treas.*

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Ferro Chrome	English	The American
Ferro Silicon	French	Swedo Iron Co.'s
Calcium Silicide		
Silico Manganese		

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Open Hearth Use		Lump
Blast Furnace Use		Ground

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Men of Industry

(*Concluded from Page 17*)

Co.; secretary-treasurer, W. G. Gude, of STEEL.

The following directors also were chosen: R. E. Kennedy, American Foundrymen's association; E. K. Smith, Electro Metallurgical Co.; T. J. Magnuson, Champion Foundry & Machine Co.; Gottfrid Olson, Beloit Foundry Co., Beloit, Wis.; L. J. Wise, Chicago Malleable Castings Co.; D. E. Clifford, Hickman Williams & Co.; James Thompson, Hubbard division, Continental Roll & Steel Foundry Co., East Chicago, Ind.; and W. H. Parker, American Steel Foundries.

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Edwin M. Lavino, president, E. J. Lavino & Co., Philadelphia, has returned from a trip to Europe.

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R. A. Schoenfeld has been appointed representative in the Chicago dis-

trict for the Cooley Electric Furnace Co., Long Island City, N. Y., with offices at 81 West Van Buren street, Chicago.

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A. E. Goosen has been appointed purchasing agent for the Olds Motor Works, General Motors affiliate, Lansing, Mich.

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W. D. Moore, president, American Cast Iron Pipe Co., Birmingham, Ala., has been elected first vice president of the Birmingham chamber of commerce.

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D. E. Wilson, vice president and treasurer, Woodward Iron Co., Woodward, Ala., has resigned, effective Dec. 31. He has been with the company for over 22 years.

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Hugh Morrow, president, Sloss-Sheffield Steel & Iron Co., Birmingham, Ala., has been named member of a special legislative committee of the Birmingham chamber of commerce.

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Robert Gregg, president, Tennessee Coal, Iron & Railroad Co., Birmingham, Ala., made the principal address at the annual luncheon of the Birmingham chamber of commerce, Dec. 14.

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Arthur Landis, vice president, Auburn Automobile Co., Auburn, Ind., has been elected a director and appointed vice president in charge of operations at the Connersville, Ind., and Auburn plants of the company.

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Frank G. Brinig, for eight years assistant sales manager, Erie City Iron Works, Erie, Pa., until his appointment as works manager six months ago, has been named general manager, climaxing 30 years' association with the company.

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Howard Coonley, president, Walworth Co., Boston, has been re-elected president of the American Standards association for 1934.

F. E. Moskovics, chairman, Marmon-Harrington Co., Indianapolis, was re-elected vice president.

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John H. Nelson, Negaunee, Mich., general superintendent of the Marquette range ore properties of Republic Steel Corp., Youngstown, O., has been appointed general manager of the company's Lake Superior district ore properties, succeeding F. J. Webb, whose death was noted in STEEL, Dec. 11.

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Frank M. Robbins has been elected president, Ross-Meehan Foundries, Chattanooga, Tenn., to succeed the late G. F. Meehan.

A. Lee Read has been chosen vice president in charge of research, Harry R. Davies vice president in charge of sales, and Henry Bond secretary and treasurer.

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B. C. Hooper, formerly sales manager of the industrial truck division, Baker-Raulang Co., Cleveland, recently has been placed in charge of the company's Chicago sales office.

W. F. Hebard, formerly with the W. F. Hebard Co., then Chicago representative for Baker-Raulang, is associated with Mr. Hooper.

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Robert A. Solborg, vice president, Armco International Corp., has been decorated with the cross of the Legion of Honor by the French government, according to cable advices. A former resident of Middletown, O., he is now located in Paris, where he is in charge of European business of the American Rolling Mill Co., Middletown.

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William Forebaugh, Luria Bros. & Co., has been elected president of the Ferro club, social organization of Philadelphia scrap brokers and dealers.

John Malloy, Malloy & Schreiner Inc., has been chosen vice president; A. R. Robinson, associated with R. L. Batteiger, secretary; and John Hunt, T. J. Hunt & Sons, treasurer.

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Addis E. McKinstry has been elected to the presidency of International Harvester Co., Chicago, at a special meeting of the board of directors, Dec. 15. He succeeds the late Alexander Legge, whose death was noted in STEEL for Dec. 11. Mr. McKinstry formerly was first vice president of the company and in 1929 was chosen president of the National Association of Farm Equipment Manufacturers.

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W. A. Nugent has been appointed sales manager in charge of all pneumatic and electric tool sales for Independent Pneumatic Tool Co., Chicago. He has been with the company for 19 years and during this time has served variously as St. Louis branch manager, assistant to the president and district manager of the Chicago territory.

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Joseph E. Otis Jr., executive vice president, Stewart-Warner Corp., Chicago, has been elected to the board of the company to fill the vacancy created by the resignation of C. B. Smith, former president. Mr. Otis has also been elected a member of the executive committee.

V. R. Bucklin, vice president-treasurer and member of the executive committee, and L. H. La Chance, formerly chairman of the board of the corporation and recently president of a subsidiary, the Stewart Die Casting Corp., have resigned all of their official positions, except as directors.

Germans Chary of Ore

High production costs are limiting German prospecting for new iron ore deposits, according to Consul Yost, at Cologne. Iron ore is now extracted in nine districts of Germany. Considering the relatively short life of the German deposits remaining, the largest deposits having been lost because of the war, it is not deemed advisable to extract ores on too broad a scale.

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Equipment

Chicago—Equipment markets continue to record moderate gains in inquiries but there is little expectation of the closing on a large portion of such business before next year. Sales this month generally are equal to or better than the November rate. Purchases by the government for various machine shops have helped to swell machine tool sales recently. Additional business of this type is in prospect.

Inquiries and orders from railroads are confined principally to eastern carriers. The Milwaukee road has yet to close on about 20 machine tools now pending, while the Santa Fe is inquiring for a plate roll as well as a pipe machine. Prospects for better activity at car shops during 1934 give some hope for additional purchases of machine tools and other equipment.

Some steel companies are slightly more active in the purchase of various types of miscellaneous equipment. Purchase of a few machine tools by the Youngstown Sheet & Tube Co. for its Indiana Harbor plant is in prospect. General Household Utilities Co. is completing installations of presses, enameling ovens and other facilities for the manufacture of refrigerator cabinets here, this activity having been transferred from Detroit to a new plant in Chicago.

Cleveland—Reversing the customary seasonal declining trend, sales and inquiry for machine tools and equipment are holding in fair volume and dealers are optimistic over prospects for first quarter of 1934. It is felt that some business coming in now has been held up since November because of the somewhat cloudy outlook at that time.

Pacific Coast

Pacific Coast Prices, Page 43, 44, 46

San Francisco—(*By Air Mail*)—The feature of the iron and steel market was the opening of bids on 20,000 tons of 85 and 112-pound tee rails and 6000 tons of track fastenings for the Western Pacific. No award has yet been made.

Reinforcing bar bookings were the second largest for any week so far this year, 7738 tons being placed. For the week ending July 21 the high week of the year, 10,168 tons were awarded. Pacific Coast Steel Corp. secured 6500 tons for the pier, quay wall and repair basin project at Pearl Harbor, T. H.

Soule Steel Co. took 133 tons for the metropolitan water district, Los Angeles, and unnamed interests booked 400 tons for the Woodcraft home at Riverside, Calif. Soule Steel Co. is low on 916 tons for Boulder dam.

Plate awards were the largest since the first of September and aggregated 2075 tons. The contract for 1500 tons for tunnel lining plates for the San Francisco-Oakland bridge has been awarded. Unnamed interests took 200 tons for boilers for the Times building, Los Angeles.

Youngstown Steel Car Corp., Niles, O., is low on 1365 tons of tunnel plates and 1135 tons of shapes for the metropolitan water district, Los Angeles.

Over 7300 tons of shapes were placed, the largest of any week since Nov. 11. Consolidated Steel Corp. booked 2700 tons for hangars at Hamilton Field, Calif., and 375 tons for a plant extension at Boulder dam for Babcock & Wilcox Co. Columbia Steel Co. secured 1200 tons for a plant at Davenport, Calif., for the Santa Cruz Portland Cement Co. Virginia Bridge & Iron Co. took 370 tons for a foundry extension at Pearl Harbor, T. H., and 550 tons for a plant at Loving, N. Mex. Bids have been opened on 750 tons of piling for work in Ventura County, California, and on 340 tons for a pier extension at Fort Mason, Calif.

Due to the 2½ per cent sales tax existing in California fabricators find themselves handicapped by $2 a ton on all material fabricated in the state. The advantage now lies entirely with eastern structural shops.

American Cast Iron Pipe Co. took 120 tons of 8-inch pipe for Redwood City, Calif. Santa Cruz and Alhambra, Calif., are taking bids respectively for 740 tons and 194 tons.

Private Projects Livelier

Seattle—While public works still predominate, private enterprises are beginning to develop. The iron and steel outlook in the Pacific Northwest is improving and within 30 days it is anticipated that several large projects, pending for weeks, will be awarded. Continental Pacific Grain Co., announces that John S. Metcalf Co., Chicago, is preparing plans and E. F. Carter, of that company, will supervise construction of a $1,000,000 concrete grain elevator at Vancouver, Wash., soon.

Local interest attaches to the Railroad avenue project, bids Dec. 21. Seattle has received bids for furnishing 400 cast or rolled steel car wheels. Rainier Brewing Co. announces it will remodel its local plant at cost of $500,000, increasing annual capacity to 500,000 barrels.

Forest Grove, Oreg., in the market for 250 tons of water pipe, has decided on wood stave material. An unnamed Portland interest took 50 tons of cast iron pipe for Canby, Oreg. Elma, Wash., has delayed award of 4 and 6-inch cast iron pipe for 30 days. Poulsbo, Wash., will open bids next week for 75 tons of 6 and 8-inch cast iron pipe and fittings.

About 150 tons of new steel plates are being used in repairing the steamer HAMLIN F. MCCORMICK, by Todd Dry Docks Inc., Seattle.

There is no change in the wholesale jobbing trade, volume being reduced by seasonal conditions. Prices are firm, as are also mill prices. Scrap is also strong and Oriental buyers continue interested. A large steel steamer, estimated to contain 4100 tons of steel and machinery, has been sold to Japan for scrapping. A local exporter has purchased 1500 tons of used logging road steel rail for shipment to Japan.

Steel in Europe

Foreign Steel Prices, Page 46

London—(*By Cable*)—Moderate increase in steel and iron production and little change in foreign trade marks the statistical position of Great Britain for November. Steel production at 695,000 tons is a gain of 26,700 tons over October, and pig iron output at 374,900 tons is 1600 tons greater than the October total.

Steel and iron imports in November were 91,927 tons, an increase of 3073 tons over October; exports at 184,391 tons showed a loss of 9222 tons from October.

General market tone is satisfactory, with numerous inquiries of all descriptions. Actual orders are less active, due to the approach of the year end when buyers restrict commitments. Export inquiries are improving. Tin plate is weaker. Foreign markets find American prices increasingly attractive.

The continent reports export trade more active. France has booked some plate and sheet orders for Manchuria. Belgium has received further orders from Russia for plates and structurals. Germany is selling steel to Great Britain, the Scandinavian countries and South America.

Here and There In Industry

JOSEPH T. RYERSON & SON INC., Chicago, has under way an extensive addition to its St. Louis steel service plant. Most of the addition will be devoted to warehousing of products requiring protection from atmospheric changes. A circulating warm air system will assure proper storing of sheets, tool steel, welding rod, cold-rolled bars, bands, hoops and other high grade steel. The new heated area will be almost three times that in the present plant. A large span of unheated type is also being added, for storage of mild steel bars and similar products, with facilities for cutting, shearing and loading.

Motor trucks will back into a recessed pit in the new building, with truck floor even with the loading platform. A new crane will be installed and an existing crane and runway will be extended through the new building. Railroad spurs enter the new building for loading and unloading cars.

Many new products and sizes will be added to stocks at St. Louis, giving a widely diversified service. In addition to the St. Louis warehouse the Ryerson company has facilities at Chicago, Milwaukee, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia and Jersey City, N. J.

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Massillon Rivet & Mfg. Co., Massillon, O., has bought the plant formerly occupied by the W. R. Harrison Co. at Massillon, which it will utilize for the manufacture of automobile springs.

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Sullivan Machinery Co., Chicago, will start manufacture of air compressors at its plant at Michigan City, Ind., by Feb. 1, 1934. This is a transfer of production from the plant at Claremont, N. H. A. D. Ferguson is plant manager.

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Columbian Iron Works, Chattanooga Tenn., manufacturer of fire hydrants and valves, has been bought by the Mueller interests, Decatur, Ill., and will be remodeled and improved. Morrow Chamberlain is president of the Chattanooga company.

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Nelson Machinery & Mfg. Co., 12507 Plover avenue, Lakewood, O., C. D. Nelson president, manufacturer of electrical appliances, has leased 30,000 square feet floor space at East Seventy-ninth street and Ewald avenue, Cleveland. Operations will be moved to the new location, which will give about twice the former space.

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Steel Industries Engineering Corp., Pittsburgh, recently received an order for an electric rotary clay gun from Frodingham Iron & Steel Ltd., for its Appleby Iron Co., Scunthorpe, Lincolnshire, England. This is the fourth gun of a similar nature purchased by the Frodingham company.

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Sterling Wheelbarrow Co., Milwaukee, is operating at full normal capacity to meet demand for its products for public works projects the country over. Demand for wheelbarrows, shovels, axes and spades has grown to large proportions and wholesalers are ordering heavily to fill depleted stocks.

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Milwaukee Gas Specialty Co., 2025 West Clybourn street, Milwaukee, has found heavy demand for its newest product, a beer keg tap, with demand from all sections of the country, but heaviest from Milwaukee and Chicago districts. Gas range and water heater equipment demand is down seasonally.

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H. A. Brassert & Co., Chicago, have received an order from Republic Steel Corp., Youngstown, O., for rebuilding two Brassert gas washers into high-efficiency cyclonic static tower washers, with installation of ceramic materials; also for a 12-inch Brassert automatic strainer which will clean the water ahead of the spray nozzles for these two washers. These changes are for the plant at Buffalo.

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Kearney & Trecker Corp., Milwaukee, manufacturer of milling machines, in the past six months has increased productive hours of labor sevenfold, from 5500 in July to 40,000 in November and December still is increasing. Since June 1 over 300 employes have been recalled. Inquiries are increasing, evenly divided between domestic and export. France, Italy, England and Japan have been the largest foreign buyers.

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Oregon Charcoal Iron Co., Portland, Oreg., incorporated in 1921 to produce charcoal iron at Seappose, Oreg., has been reorganized as the Iron Ore Development Co., with George Heusner, Portland, as president and David L. Davies, also of Portland, acting secretary. It is planned to use cheap electric current from the Bonneville dam to produce iron in the electric furnace. It is believed this can be done in competition with blast furnace iron from other districts.

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Capitol Steel Corp. of New York, reinforcing steel products, has acquired the former Kalman steel concrete bar warehouse at 300-310 Utica avenue and the Erie railroad, Jersey City, N. J., including buildings, derrick, power cutting and bending machines, gaging tables and other equipment. Welding equipment will be installed for fabricating welded products. The company's New York office and warehouse will continue to function as heretofore, the New Jersey warehouse being intended as additional facilities to take care of expanding business.

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Construction and Enterprise

New England

DURHAM, N. H.—University of New Hampshire, E. M. Lewis president, plans an electric generating plant at the university, costing $30,000 or more.

KINGSTON, R. I.—Rhode Island state college, R. G. Bressler, president of the board of managers, plans construction of a power plant to cost about $100,000.

New York

AUBURN, N. Y.—Bids for a new cell block at the state prison here will be received late this month. An appropriation of $226,000 has been provided.

COHOCTON, N. Y.—George Kirchner & Son, Rochester, N. Y., has been awarded the contract for a central high school at Cohocton, N. Y.

EDEN, N. Y.—Town plans a water supply, including pumping machinery and equipment, to cost about $73,000. E. M. Webster is town clerk.

HAMMONDSPORT, N. Y.—Citizens have voted $121,000 for construction of a high school building. Robert Graham, Middletown, N. Y., is architect.

WATKINS GLEN, N. Y.—Purchase of a site has cleared the way for immediate erection of a $55,000 postoffice at Watkins Glen, N. Y.

New Jersey

CAMDEN, N. J.—City has voted a fund of $10,000,000 for construction of a municipal electric light and power plant.

MANVILLE, N. J.—Great Eastern Brewing Co., L. P. Knopf, president, 92 Main street, will take bids soon for a brewing plant, through B. S. Gruzen, architect, Concourse building, Jersey City, N. J. Cost estimated at about $750,000. C. J. Kupper, 409 East Main street, Manville, N. J., is engineer.

Pennsylvania

BADEN, PA.—General Materials Co., Baden, Pa., plans to build an unloading derrick on the right bank of the Ohio river between Baden and Rochester, Pa.

WESTERN, PA.—Sketches are being drawn for a brewery to be erected here, owner's name being withheld. Cost is close to $200,000. Leslie V. Abbott, 8 Kenwood village, Louisville, Ky., is architect.

Ohio

DAYTON, O.—Brownell Boiler Works plant was practically destroyed by fire, with loss estimated at $150,000.

CLEVELAND—Great Lakes Distilleries Co, F. H. Eggers president, 11505 Lake avenue, has sketches by F. Hronek and R. L. Lunt, 5208 Harvard avenue, for remodeling a 2 and 3-story building for a distillery at cost of about $250,000.

Michigan

DETROIT—Advance Fan & Blower Co., 2847 Bagley avenue, has been incorporated with $15,000 capital to manufacture propeller fans and blowers, by Arthur F. Groscop, 14864 Indiana avenue, Detroit.

DETROIT—Crawford Smelting & Refining Co. has been incorporated with $10,000 capital to undertake a mining, smelting and refining business by Arthur M. Crawford, 607 Shelby street, Detroit.

DETROIT—Detroit Engineering & Design Service Corp., 525 Woodward avenue, has been incorporated with $5000 capital to engage in special machine design, by Harry Monschein, 3751 Buena Vista avenue, Detroit.

DETROIT—Brewery Equipment Co. has been incorporated with $10,000 capital to manufacture and lease equipment for manufacturing beverages, by C. Winningham, 11-230 General Motors building, Detroit.

ST. LOUIS, MICH.—Alma Mfg. Co., plans a 1-story plant for the manufacture of axles and other automotive parts, to cost $28,500. Preliminary plans are being considered.

Indiana

INDIANAPOLIS—Gold Medal Brewing Co., 1300 Madison avenue, plans expansion of its plant to cost about $100,000. Electrical equipment is to be installed. McGuire & Shook, Architects and Builders building, Indianapolis, are architects. F. W. Hoch is president.

RICHMOND, IND.—Richmond Brewing Co. will take bids soon on a general contract for a brewery to cost about $700,000. Vonnegut, Bohn & Mueller, 610 Indiana Trust building, Indianapolis, are architects. Equipment is being ordered.

Illinois

CHICAGO—Industrial Barge Lines Inc., 35 East Wacker drive, has been incorporated with 300,000 shares capital stock to operate a transportation line on Illinois waterways, by Paul N. Dale, 134 North LaSalle street.

CHICAGO HEIGHTS, ILL. — John Maier & Co., 1640 Chicago road, has been incorporated with 50 shares capital stock to manufacture metal products, by Charles F. Burke, correspondent, 841 East Sixty-third street, suite 219-B, Chicago.

CHICAGO—Comfort Air Corp., 100 West Monroe street, has been incorporated with 1000 shares capital stock to manufacture cooling, ventilating and air-conditioning systems, by Adams, Hawley, Brown & Adams, correspondents, 100 West Monroe street, Chicago.

CHICAGO—Super Cold Midwest Co., 1500 South Western avenue, has been incorporated with 100 shares capital stock to manufacture mechanical refrigeration equipment, by Marie H. Guidarolli, 188 West Randolph street, Chicago, correspondent.

CHICAGO—HD Electric Co., 79 West Monroe street, has been incorporated with 1000 shares no par value to manufacture electrical machinery, accessories and equipment, by Thurston R. Lundberg, correspondent, 160 North LaSalle street, Chicago.

CHICAGO—Continental Can Co., Inc., 100 East Forty-second street, New York, has bought a 3-story building at 3815 South Ashland avenue to be used for manufacturing purposes. Production of containers for motor lubricating oil has increased greatly, calling for larger facilities.

CHICAGO—Merit Shank & Stamping Co., 3907 North Western avenue, has been incorporated with 1500 shares capital stock to manufacture and deal in metals and metal products, by Mark D. Goodman, correspondent, Chicago Real Estate Board building, 32 West Randolph street, Chicago.

CHICAGO—Angle Steel Equipment Co., 32 South Clinton street, has been incorporated with 10 shares capital stock to deal in office equipment, of steel or other materials, by Arne B. Hummeland, 830 Insurance Exchange building, Chicago, correspondent.

CHICAGO—I. Levinstein & Sons Inc., 122 South Michigan avenue, has been incorporated with 50 shares capital stock to conduct a business in scrap iron and steel, by Kabaker & Kabaker, 188 West Randolph street, correspondents.

Wisconsin

MILWAUKEE—Center Street Fuel Co., 3019 West Center street, has leased four acres of dockage near North Eighth street and will install coal-handling machinery to cost about $25,000 next spring.

MILWAUKEE—Red Star Yeast & Products Co., 221 East Buffalo street, subsidiary of the National Distilling Co., has bought a warehouse at 2011 North Thirtieth street, and will install equipment for rectifying and bottling whiskies, gin and other spirits. Bruno Bergenthal is president.

MILWAUKEE—Trustees of Milwaukee county institutions have engaged architects for new construction, as follows: Eschweiler & Eschweiler, 720 East Mason street, central laundry $175,000; Robert A. Messmer & Bro., 231 West Wisconsin avenue, Muirdale sanitorium addition, $150,000; Bruce Uthus, 7238 West Lloyd street, central incinerator, $50,000; William L. Coffey is general manager.

PRINCETON, WIS.—Bond issue of $125,000 has been voted to build a municipal waterworks and sewage plant and system.

RICE LAKE, WIS.—Rice Lake Brewing Co. has been incorporated with $175,000 capital and will use

about $150,000 remodeling an idle factory into a brewery, for which complete new equipment will be required. John C. Breunig, Bloomer, Wis.; E. J. Young and H. F. Moores, Rice Lake, Wis., are incorporators.

WAUKESHA, WIS.—Michael Yunt Co., 225 Grand avenue, builder of large-capacity bottle washing units, which planned a $30,000 addition this fall, has deferred building until spring.

Iowa

ATLANTIC, IOWA—Plans are being obtained by the city for a 1,500,000-gallon elevated tank and other waterworks improvements, to cost about $33,000. T. E. Nichols is superintendent.

MISSOURI VALLEY, IOWA—City has preliminary plans for electric generating equipment, a street lighting system and other improvements, to cost about $47,000. J. J. Owen, Missouri Valley, Iowa, is engineer.

Nebraska

HASTINGS, NEBR.—City is having plans drawn for an addition to the municipal electric light and power plant, to cost $28,000. P. T. Naylor is engineer.

Missouri

ST. LOUIS—Charles Werner, 2019 North Broadway, will build a 1-story machine shop and metal specialties plant 40 x 150 feet, costing $5000, at 2119 North Broadway. This is double the space now occupied. Equipment to cost about $3000 will be installed.

SPRINGFIELD, MO.—United Iron Works plant, North National avenue, has been bought at sheriff's sale by the Republic National Bank & Trust Co., Dallas, Tex. Stock in trade is not included. A purchaser desiring to operate the plant could buy both plant and stock.

STANBERRY, MO.—Board of public works plans erection of a municipal electric light and power plant to cost about $98,000. Henrici-Lowry Engineering Co., 114 West Tenth street, Kansas City, Mo., is consulting engineer.

TRENTON, MO.—City plans construction of an electric light plant to cost about $250,000. Henrici-Lowry Engineering Co., 114 West Tenth street, Kansas City, Mo., is engineer.

Oklahoma

GEARY, OKLA.—Plans are being made for construction of a municipal electric light and power plant to cost about $65,000. J. C. McKeel, Geary, is engineer.

Texas

KILGORE, TEX.—Hiotone Refining Co. and Southern Petroleum Co. have let a contract for a gasoline refining plant with cracking process to Mid-Continent Engineering Co., Kilgore and Dallas, Tex., to cost $125,000.

Southern States

HAVRE DE GRACE, MD.—Hartford Pure Rye Distillers Inc., H. Edgar Hough, president, has been organized and has bought a former textile mill for conversion into a distillery. Remodeling and equipment will cost about $75,000.

KNOXVILLE, TENN.—Brooks-Payne Equipment Co. has been incorporated with $5000 capital to act as sales agent for machinery, tools and equipment, by Wallace Brooks, K. E. Steinmetz and Harold Wimberly.

WASHINGTON—Kenilworth Brewing Co., care Hymen Goldman, 635 Indiana avenue, n. w., has been formed to build a brewery plant to cost about $100,000. Electrical equipment is included.

Pacific Coast

ARCADIA, CALIF.—First unit of a brewery for the Schmidt Brewing Co. on a ten-acre site recently purchased will be financed by a group headed by A. N. Multer, former mayor.

LOS ANGELES—Koch Brewing Co. will spend more than $450,000 to bring its new plant up to full capacity of 1000 barrels per day. The new brewery is in the plant formerly occupied by the Multicolor Motion Picture Co. Herman Koch is in charge.

SELMA, CALIF.—City plans construction of a diesel electric light and power plant to cost $57,000; also 300,000-gallon tank and tower. E. K. Hursey, Syndicate building, Oakland, Calif., is engineer.

ALMIRA, WASH.—Voters have approved a bond issue for a proposed municipal waterworks system.

EVERETT, WASH.—Miners Smelting & Refining Corp. has been incorporated with $500,000 capital, by George W. Tweedale and associates, 403 Central building.

SEATTLE—Gilmak Brewing & Distilling Co. has commissioned A. H. Robertson, engineer, to prepare plans for remodeling its building at 2501 Elliott avenue at cost of about $25,000. Equipment costing $50,000 will be installed.

Dominion of Canada

KIRKLAND LAKE, ONT.—Hydro-electric power commission of Ontario, 190 University avenue, Toronto, Ont., plans a 60-mile, 110,000-volt, steel-tower transmission line from Kirkland Lake to Iroquois Falls, Ont., to cost about $300,000. F. A. Gaby is chief engineer.

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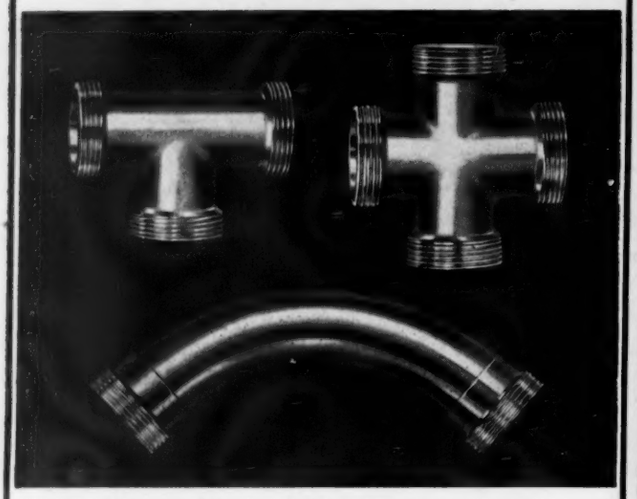

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Cars, Steel Freight

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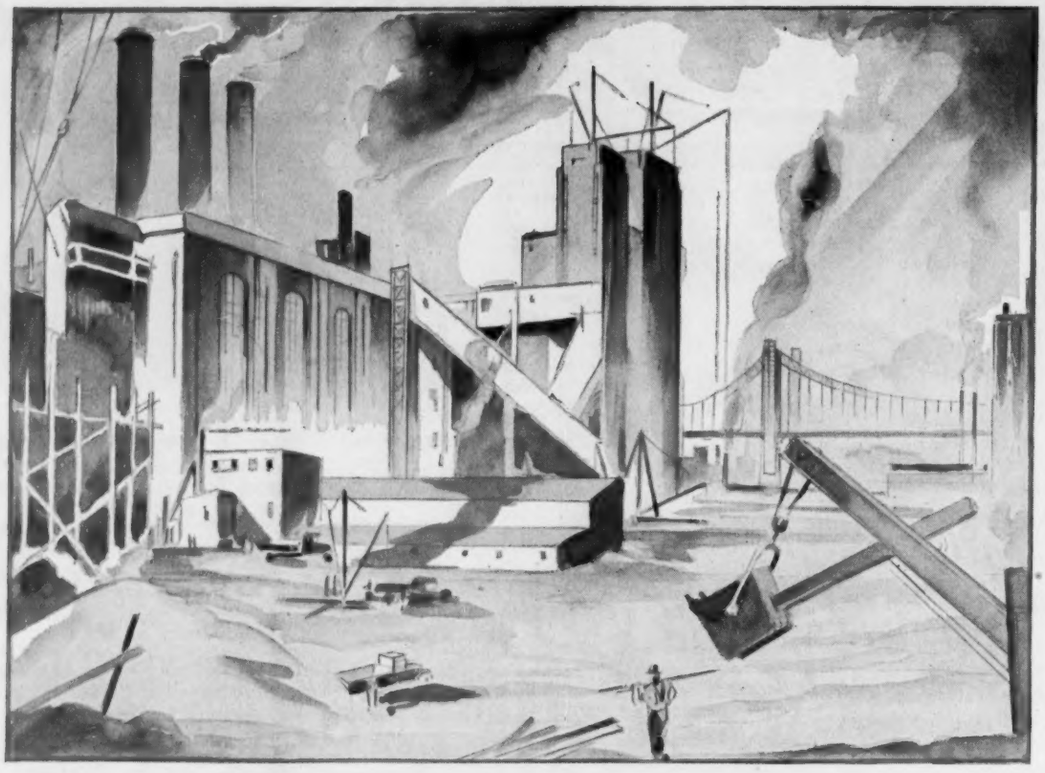

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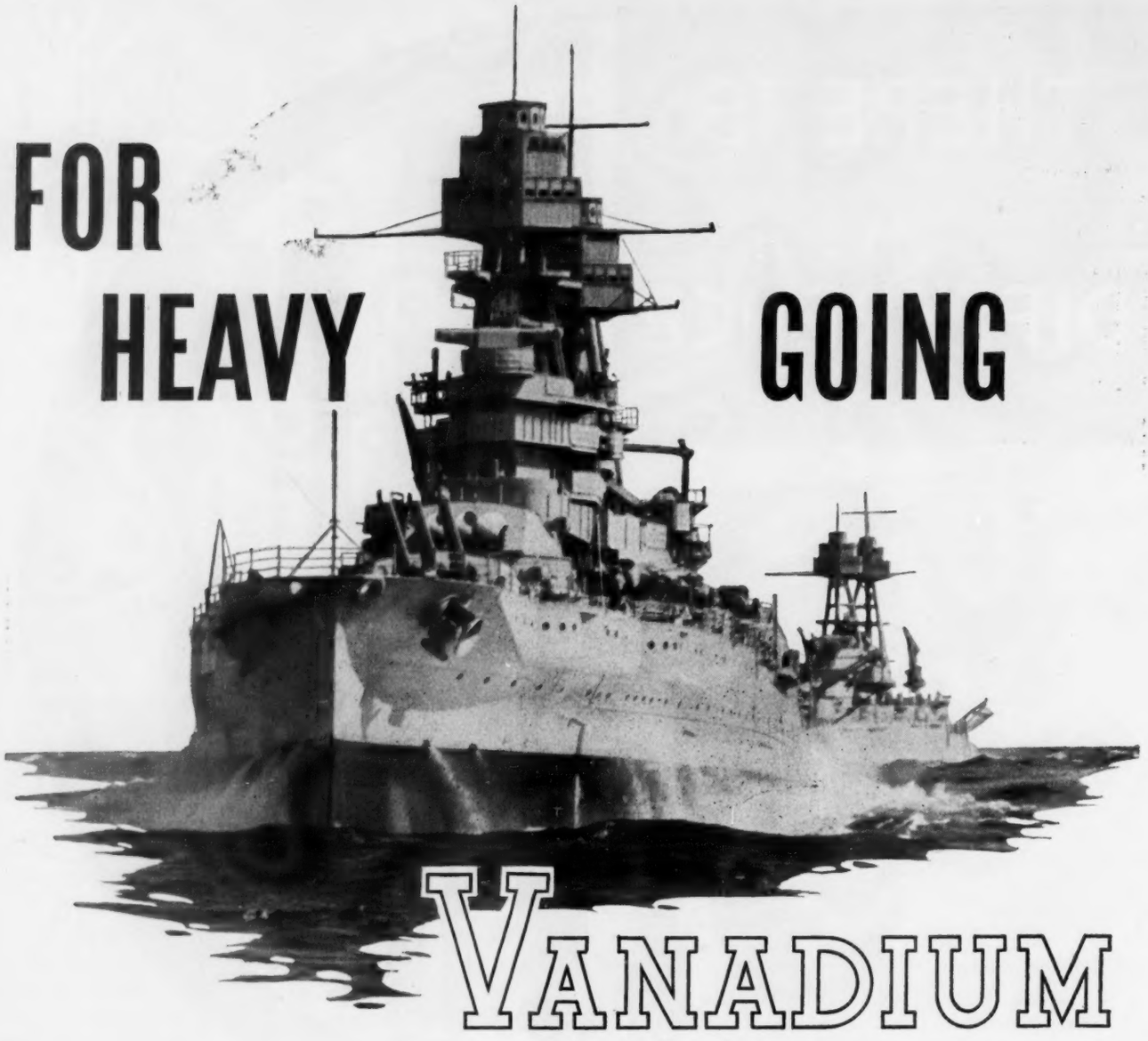

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